INSECTS OF MICRONESIA
Diptera: Stratiomyidae; Calliphoridae[1]

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STRATIOMYIDAE

INTRODUCTION

Comparatively few records of Stratiomyidae from Micronesia appear in the literature. Three species were originally described from Micronesia: *Lophoteles plumula* Loew, from the Radak Chain of the Marshall Islands, and *Paracechorismenus guamae* James and *Cephalochrysa infuscata* James from Guam. Bohart and Gressitt (1951)[2] have recorded *Hermetia illucens* (Linnaeus) and *Microchrysa flaviventris* (Wiedemann), and James (1950) has added *Wallacea albiseta* de Meijere, probably the subspecies herein described as new, from Guam. In works dealing with other Pacific areas, Hardy and James have treated the very limited Hawaiian fauna (Insects of Hawaii **10**: 307-319, 1960), and Bezzi, Ricardo, Lindner, James, and others have dealt, either fragmentarily or comprehensively, with the family as it occurs in Fiji, Samoa, some of the islands of the East Indies, the Solomon Islands, New Caledonia, and Okinawa.

The present study is based on a collection of more than 800 specimens representing 24 species. By way of comparison, James recorded 30 species from the Solomon Islands, and Lindner, 22 species from Ceylon. It is noteworthy that all Micronesian species are either known or probable scavengers in the larval stage; aquatic Stratiomyinae and aquatic tribes of Clitellariinae are entirely absent from the known fauna. The same is true of the Hawaiian and Samoan faunas, but not of those of the Solomon Islands, New Caledonia, Fiji, or even Okinawa, from which island one stratiomyine is recorded. Scavengers in this family spread much more readily and rapidly than do the aquatic forms;

[1] Representing, in part, Results of Professor T. Esaki's Micronesian Expeditions (1936-1940), No. 113.

[2] Numbers in parentheses refer to Bibliography, B. P. Bishop Mus., Ins. Micronesia 2, 1955.

this is demonstrated by the extremely rapid and broad dissemination of *Hermetia illucens* in recent years (greatly aided unintentionally by man) and by the fact that, with the exception of a sod feeder, all forms that have been introduced into the United States from overseas are scavenger sargines. The relative remoteness of areas which have not yet been occupied by aquatic forms from larger land masses is readily apparent from the map; this absence may, in part, be due to the distance from more extensive suitable habitats.

Of the Micronesian species, the breeding habits of only two, *Hermetia illucens* and *Microchrysa flaviventris,* are known. Both were reported by Bohart and Gressitt (1951) as breeding in excrement, garbage, and vegetable wastes of various kinds in Guam. *H. illucens* may be of some sanitary importance in that it may cause enteric myiasis and may transmit pathogens mechanically. It is well known as a privy fly over much of its range. On the other hand, it has recently been pointed out that its larvae may compete in excrement with those of the house fly, to the detriment of the latter. Judgment concerning larval habits of other Micronesian stratiomyids must be made on the basis of comparison with those of related known species. The Sarginae are extensive excrement feeders; the Pachygasterinae breed in decaying plant materials or prey upon other insects that may attack either healthy, necrotic, or decaying plant tissues. The assumption that *Brachycara* is a scavenger is based on the known habits of its relatives such as *Adoxomyia* spp. Its relationship to the aquatic Clitellariinae (*Euparyphus, Oxycera, Nemotelus,* for example) is much more remote.

Distribution

From the standpoint of zoogeography, the Micronesian species may be divided into five groups. (1) Four species are widely distributed, both in Micronesia and outside that region. These are *Hermetia illucens,* the most widely distributed stratiomyid in the world; *Microchrysa flaviventris; Lophoteles plumula;* and *Brachycara ventralis.* (2) Four species seem to have entered the area from the north, and now occur only in the Bonin, Volcano, and Mariana Islands. These are *Tinda javana, Wallacea albiseta borealis, Aidomyia snyderi,* and *Paracechorismenus guamae.* The last three of these, though unknown outside of Micronesia, are not considered true endemics, since close relatives in such areas might suggest a northern invasion of Micronesia, followed by speciation or subspeciation, or by extinction in the areas from which they migrated. Typical *W. albiseta* occurs in Okinawa. (3) Two species, *Rosapha bicolor* and *Cephalochrysa infuscata,* probably reached Guam as adventitious introductions. A reasonable hypothesis to account for the existence of the latter species is that it may be descended from larvae of *C. chrysidiformis* or a common ancestor which may have been carried to the island by floating coconuts or in overripe fruits transported by natives. (4) Invaders from the south, through Yap or the Palaus, include *Evaza discalis, Trichochaeta rece-*

Distribution of Micronesian Stratiomyidae

	Micronesian Island Groups												
					Caroline								
	Bonin	Volcano	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	Other Localities
Sarginae													
1. Cephalochrysa gracilis*									×				
2. Cephalochrysa rugulosa*									×	×	×		
3. Cephalochrysa nigra*									×				
4. Cephalochrysa infuscata			×	×									
5. Cephalochrysa chrysidiformis								×					Solomon Is., New Hebrides
6. Microchrysa flaviventris				×	×	×			×	×			Oriental Region; Japan, Okinawa, New Guinea, New Caledonia
Clitellariinae													
7. Brachycara grandis*										×			
8. Brachycara ventralis				×	×	×	×			×	×	×	Indian Ocean islands, New Guinea
Hermetiinae													
9. Hermetia illucens	×			×	×		×	×	×		×	×	Tropics and subtropics of world, esp. America
Pachygasterinae													
10. Artemita insularis*	×												
11. Tinda javana	×	×											Mauritius; Ceylon; Malaya; islands of East Indies
12. Evaza discalis*					×								
13. Evaza (?) sp.					×								
14. Trichochaeta recedens					×								New Guinea; Molucca Is.; Philippine Is.
15. Rosapha bicolor				×									Darjiling; Philippine Is.
16. Lophoteles plumula				×	×	×	×	×	×	×	×		Seychelles Is.; New Guinea; New Britain; Solomon Is.; New Hebrides
17. Paracechorismenus guamae				×									
18. Wallacea argentea					×								Amboina; Solomon Is.; New Guinea; New Hebrides; Queensland; Philippine Is.
19. Wallacea albiseta borealis*	×												
20. Aidomyia snyderi*	×												
21. Camptopteromyia flavipes*						×							
22. Camptopteromyia obscura*					×								
23. Camptopteromyia tibialis*					×								
24. Camptopteromyia lanata*					×								

* Described as new.

dens, Wallacea argentea, and the *Camptopteromyia* species. (5) True endemics account for six species, *Cephalochrysa gracilis, C. rugulosa, C. nigra, Brachycara grandis, Artemita insularis,* and *Evaza* (?) sp. The three species of *Cephalochrysa* are placed in this category because their distributional pattern suggests that they developed, probably at a more remote time than what we might call the "marginal" endemics of category (1), within the region itself. The other three species are placed here because of the relative remoteness of their relationship to other species of the Pacific area; the *Evaza* species, if indeed it is an *Evaza,* is an aberrant one; the *Artemita* and *Brachycara* species probably have their closest relationship with American, rather than with Asio-Oriental-Australian, species.

To the list of collectors given in the introduction to this series (1954, Ins. Micronesia 1) should be added the name of Dr. Fred Snyder, whose collections in the Bonin Islands have added very materially to this study. Collections made by Jared J. Davis on Pingelap have also added some material.

No attempts have been made to give complete citations to the genera and species included, but in each case the original description is cited, as well as any literature that may be of especial significance to these studies. The generic key is constructed for the purpose of helping to identify the Micronesian forms; parts of it may be subject to exception when applied to extralimital forms.

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SYSTEMATICS

KEY TO MICRONESIAN GENERA OF STRATIOMYIDAE

1. Crossvein m-cu present; antenna aristate; scutellum unspined; discal cell emitting three veins, that is, vein M 3-branched; Micronesian species, except *Cephalochrysa nigra,* with at least thorax mainly metallic blue, green, or purple (Sarginae) 2

Crossvein m-cu absent, vein Cu_1 forming a part of lower margin of discal cell; discal cell emitting three or four veins, when former, third vein is Cu_1 and media only 2-branched; Micronesian species never metallic blue, green, or purple 3

2(1). Small species, about 4 mm in length; anal cell fully as broad as two basal cells combined; vein M_{1+2} from crossvein r-m to apex of discal cell, in Micronesian species, feebly developed; abdomen green in female, mostly yellow in male .... **Microchrysa**

Larger species, usually 7 mm or more in length; anal cell narrower than width of two basal cells combined; vein M_{1+2} fully developed on its entire length .... **Cephalochrysa**

3(1). Media 3-branched, that is, discal cell emitting four veins; scutellum unspined; antenna never aristate........ 4
Media 2-branched, that is, discal cell emitting three veins (Pachygasterinae)...... 5

4(3). Terminal antennal piece forming a narrow style which terminates in a bristle-like hair; flagellar annuli not grooved longitudinally on their inner surface; robust species, not over 8 mm in length, usually much smaller (Clitellariinae) ....**Brachycara**
Terminal antennal piece as long as remainder of flagellum, vane-like, fourth to sixth flagellar annuli with a longitudinal groove on inward side; large, elongated species, 12 mm or more in length, with a pair of translucent areas on the abdomen basally (Hermetiinae)........**Hermetia**

5(3). Scutellum with one or two pairs of spines........ 6
Scutellum unspined, usually with an apical row of denticles or cornicles, always more than four in number, which may be minute and of uniform length, or variable in size and larger medially........11

6(5). Scutellum with one pair of spines, laterally placed........**Evaza, in part**
Scutellum with two pairs of spines........ 7

7(6). Abdomen round or transversely oval in outline, no longer than wide; antennal flagellum elongated, longer than relatively short style; eyes densely haired ....**Artemita**
Abdomen elongated-oval, longer than broad; antenna with main part of flagellum shortened, much shorter than elongated terminal style or arista; eyes thinly pilose or bare........ 8

8(7). Antenna terminating in a long, micropubescent style or arista........ 9
Antenna terminating in a densely plumose arista........10

9(8). Terminal antennal piece forming an elongated, vane-like style........**Tinda**
Terminal antennal piece forming an arista........**Evaza**

10(8). Front produced into a short cone, antennae arising on a plane distinctly anterior to anterior margin of eyes; crossvein r-m punctate or very short; scutellar spines of approximately equal length........**Trichochaeta**
Front not produced, antennae rising on a plane no farther forward than anterior margin of eyes; crossvein r-m distinctly present; median scutellar spines much longer than outer ones........**Rosapha**

11(5). Abdomen distinctly longer than broad; flagellum of antenna terminating in a densely black-haired arista; scutellum apically with numerous denticles, visible under high magnification........**Lophoteles**
Abdomen at least as broad as long; flagellum of antenna terminating in a style or a bare, micropubescent, or white-haired arista........12

12(11). Vein R_4 absent; vein R_{2+3} separating from R_{4+5} distinctly before crossvein r-m; R_{4+5} bent downward, forming almost a right angle at its contact with r-m; antennae set high on head, much closer to anterior ocellus than to lower angle of eye; scutellum without any indication of denticles or cornicles apically........**Paracechorismenus**
Vein R_4 present; vein R_{4+5} only gently bowed, not angulate; scutellum apically with cornicles or denticles which, though small, are at least visible under high magnification........13

13(12). Flagellum of antenna, excluding arista, distinctly longer than broad, antenna set high on head, much closer to ocellar triangle than to lower corner of eye; scutellum with a flattened margin from which project a series of irregular, distinctly visible, seta-bearing cornicles,[3] median pair usually longest ....**Wallacea**

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[3] For the distinction between the use of the terms "denticles" and "cornicles" see discussion under genus *Wallacea*, page 100.

Flagellum of antenna kidney-shaped, higher than long; antenna set closer to lower corner of eye than to ocellar triangle; scutellum at most indistinctly margined, with numerous distinct denticles visible only under high magnification 14

14(13). Vein R_{4+5} arising distinctly beyond position of crossvein r-m; wing not weakened or fractured at stigma..**Aidomyia**

Vein R_{4+5} arising distinctly before crossvein r-m, but often difficult to ascertain because wing weakened or fractured at stigma and consequently bent downward or under in preserved specimens......**Camptopteromyia**

Subfamily SARGINAE

Genus **Cephalochrysa** Kertész

Cephalochrysa Kertész, 1912, Linn. Soc. London, Trans. **15**: 99.

The genus *Cephalochrysa* is represented in Micronesia by five known species, four of which form a closely related complex which might be interpreted as comprising a superspecies; in fact, three members of this group are so closely interrelated that, if hybrids were known to occur, they would be considered as forming a polytypic species. Except for *C. gracilis* (which, however, in spite of differences follows closely the general genitalic pattern for the group), no significant differences seem to occur in the male genitalia of this complex, although marked differences are to be seen in *C. stenogaster* James from Taiwan, *C. hovas* (Bigot) from Madagascar and other islands in the Indian Ocean, and the American species. The male genital capsule is rather prominent; the forceps are thick, tapering somewhat but mainly rounded, except that the inner angle from the ventral aspect may be somewhat angulate; the ventral plate is rounded apically and notched medially, its apical part being somewhat concave ventrally to receive the forceps when at rest; the aedeagus is a cylindrical rod, produced slightly at each side and extended to a variable degree in preserved specimens. The forceps in *C. hovas,* by contrast, are acute apically and the aedeagus is prominently three-pronged; the forceps in *C. stenogaster* are elongated and recurved into an acute apex. The very different type of genitalia of the American *C. nigricornis* (Loew), with the three-pronged aedeagus and the glove-like forceps, is illustrated by Sorenson and Fluke (1953).

The bare, highly shining areas of the pleura are quite uniform for the species discussed here and will not be mentioned in the individual descriptions. They consist of a large area taking in the anterior half of the mesopleuron except its anterodorsal corner, the broad upper submarginal areas of the sternopleuron, the posterior half of the pteropleuron, and the adjacent upper parts of the hypopleuron.

All Micronesian species except *C. gracilis* have the eyes divided into areas of larger facets above and smaller facets below; this division is clearly marked

and the size difference is striking. The lower area, however, has within it (fig. 1, *b*) a differentiated, wedgelike subdivision above in which the rows of facets run in a different direction from that of the greater part of the area.

Key to species of Cephalochrysa of Micronesia and other Pacific and Indian Ocean areas

1. Abdomen spatulate, gradually broadening to a maximum at apex of fourth segment; integument of mesonotum relatively smooth, punctures surrounding hair bases and broadly separated from one another, transverse striae at most very feebly developed; face, front, antennae, proboscis, and legs wholly unicolorous, yellow (Taiwan)........ **stenogaster** James
   Abdomen ovate, as wide or almost as wide at apex of second segment as at apex of fourth; integument of mesonotum rugulose, that is, punctures not confined to hair bases and strongly confluent, or with impressed transverse striae; face and usually legs in part darkened........ 2

2(1). Mesonotum rugulose, striae independent of rugulosity, being but feebly visible just behind neck; female with median half of front, from ocellar triangle to frontal callus, elevated except for median suture, not punctate, in contrast to frontal orbits; tibiae almost white, paler than black-and-yellow femora (Madagascar, Indian Ocean islands)........ **hovas** (Bigot)
   Mesonotum, under proper magnification (at least 30×) with impressed transverse striae in addition to rugulosity or punctures; median half of front of female not distinctly elevated or, if somewhat so, distinctly punctate; at least front and middle tibiae, if paler than their femora, at least distinctly yellow........ 3

3(2). Eyes of male not differentiated into areas of smaller and larger facets; face of female fully as broad as front........ **1. gracilis**
   Eyes of male differentiated into an area of conspicuously larger facets above and one of smaller facets below; face of female distinctly narrower than front........ 4

4(3). Sexual dimorphism conspicuous; front of female strongly rugulose and brilliantly green and purple, except very narrow frontal orbits and a very narrow stripe on each side of mid-frontal suture; male abdomen yellow, with black cross bands on terga 2 to 5, usually interrupted on terga 2 and 3........ **2. rugulosa**
   Sexual dimorphism not particularly conspicuous, except as usual for group; front of female variously punctured or striated but not strongly rugulose; male with at least abdominal terga 4 and 5 wholly or nearly wholly metallic blue, green, or black........ 5

5(4). Thorax and abdomen black; front of female with punctures and longitudinal striae; wings clouded........ **3. nigra**
   Thorax and abdomen green, blue, or violet; front of female with punctures but without noticeable longitudinal striae........ 6

6(5). Wings infuscated, more so in female; pleura black in both sexes; legs of female in large part and at least middle and hind femora of male mostly black........ **4. infuscata**
   Wings lightly infuscated to hyaline in female, hyaline in male; mesopleura and pteropleura of male largely to wholly yellow; middle and hind tibiae at most black apically........ 7

7(6). Body slender; pile of antennae fine, yellow; abdomen of male mostly yellow on basal three segments (Malaya)........ **demeijerei** (Lindner)
   Body more robust; pile of antenna stiff, black........ 8

8(7). Abdomen of male wholly green to blue green (Fiji, Samoa, Hawaii)............ ....**maxima** (Bezzi)
Abdomen of male yellow medially on basal three segments..........**5. chrysidiformis**

1. **Cephalochrysa gracilis** James, n. sp. (fig. 1, *a, e*).

Male: Form slender. Eyes contiguous for about one-third distance from anterior ocellus to bases of antennae; facets above a little larger than those below, but with no clear line of demarcation. Vertical triangle and occiput black, latter with bluish reflections; frontal triangle and area beside and just below antennae obscurely yellowish, face below black; antenna brownish yellow, arista brown; proboscis light yellow. Pile of antenna black, short and inconspicuous; pile of head otherwise white.

Mesonotum bright metallic green; humeri, postalar calli and immediately adjacent areas, and apex of scutellum yellow; pile of mesonotum brassy, tomentum-like, clearly evident with proper light incidence but not conspicuous; mesonotum punctured at hair

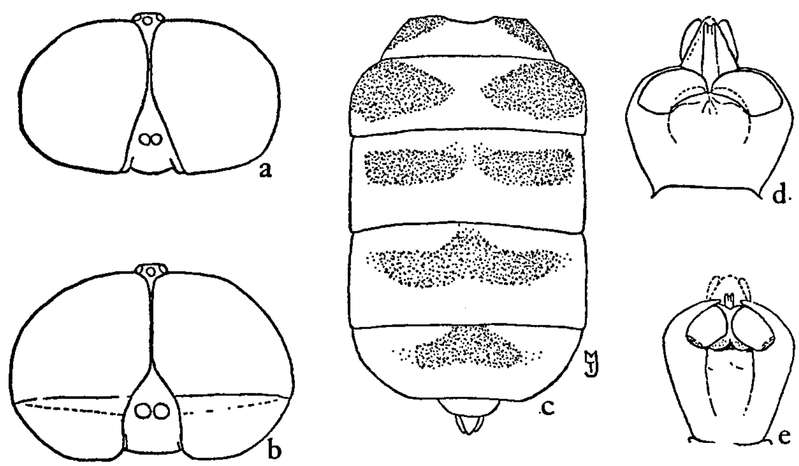


FIGURE 1.—**a, e,** *Cephalochrysa gracilis: a,* male, outline of head, anterior view, antennae omitted; *e,* male genitalia, ventral view, setae and hairs omitted. **b, c,** *C. rugulosa: b,* male, outline of head, anterior view, antennae omitted; *c,* male, abdominal pattern. **d,** *C. chrysidiformis,* male genitalia, ventral view, setae and hairs omitted.

bases and minutely transversely striated. Pleura yellow on upper half, black below and on sterna; pile white. Wing hyaline, stigmatal area not darkened; veins yellow on anterior half, brownish on posterior half of wing. Squamae yellowish, yellow-haired. Halteres yellow, knobs somewhat infuscated. Legs uniformly yellow; pile yellow, becoming black on tarsi.

Abdomen oval, reaching maximum width at apex of segment 3; purple dorsally and ventrally, shining but not as strongly so as mesonotum; pile appressed, short, black; some pale hairs on sides of terga, much longer and more abundant on terga 1 and 2 than toward apex. Genitalia yellow, slender; aedeagus similar to that of *chrysidiformis,* but lateral guards proportionately broader; terminal concavities for reception of forceps relatively deep; forceps broad, oval. Length, 6.5 mm.

Female: Head above frontal callus metallic blue, with purplish reflections (prominent in the Nanipil-Colonia paratype); face yellow, somewhat discolored below; front coarsely punctured throughout, even in somewhat elevated median portion, but not

rugulose; lower part of face and front almost parallel-sided throughout. Comparative measurements of allotype in micrometer units (60 = 1 mm): width of head 104, vertex 32, front at callus 25, face 25. Pile of head inconspicuous, though rather abundant on front; yellowish brown below, brownish to blackish above.

Mesonotum and scutellum blue, with or without purplish reflections; pleura mostly blackish to reddish black; humeri, postalar callus, margin of scutellum, an area on metapleuron, and some indefinite areas below wing base yellowish; pile dusky to reddish, mostly appressed and inconspicuous. Wings lightly clouded on apical half, stigma somewhat darker. Squamae dusky, dusky-haired. Halteres discolored yellow. Legs mostly blackish, becoming yellow at joints; middle and hind tibiae and tarsi mostly a discolored yellow; pile reddish yellow to dusky yellow, becoming black dorsally on tarsi. Abdomen strongly metallic blue with purplish reflections to purple with blue reflections; pile black. Length, 6-8 mm.

Holotype, male (US 66286), southeast Nanpohnmal (Nanponmal), 70 m., Ponape, cut native forest, light trap, Jan. 11, 1953, Gressitt. Allotype, female (KU), Palikir (Paliker)-Rhonkiti (Ronkiti), Ponape, July 17, 1939, Esaki. Paratypes (KU, BISHOP), Ponape: female, Nanipil (Nampir)-Colonia (Kolonia), Jan. 1, 1938, Esaki; female (slightly teneral), Nihpit (Nipit)-Kapiroi-Lehdau (Reitao), July 21, 1939, Esaki.

DISTRIBUTION: Caroline Is. (Ponape).

Although the two sexes differ considerably from each other, I believe I am correct in associating them. The slender body form, the relatively narrow front of the female (no wider than the face), and the undivided eyes of the male set this species apart from any others that are known to occur in Micronesia.

2. **Cephalochrysa rugulosa** James, n. sp. (fig. 1, *b, c*).

Female. Front gradually narrowing from vertex forward; face almost parallel-sided. Front and vertex brilliantly metallic green to blue, color varying with light incidence, its whole surface conspicuously rugulose and strongly contrasting in sculpturing to other head areas; occipital orbits and occiput metallic blue, latter grading into black medially; ocellar triangle, cerebrale, a narrow ridge enclosing mid-frontal suture and extending from anterior ocellus to frontal callus, and extremely narrow, hardly noticeable frontal orbits, all shining black. Frontal callus whitish, biarcuate above, abruptly yellow below and merging imperceptibly into yellow area around antennal bases; face mostly blackish. Pile of head short, inconspicuous except on cheeks and face, mostly yellowish. Antenna yellow, arista beyond basal third brown; first two segments black-haired. Proboscis pale yellow. Head measurements of holotype in micrometer units (60 = 1 mm): head width, 150; maximum width of front, 53; width at frontal callus, 40; face below antenna, 35.

Mesonotum green to blue, strongly metallic, with fine transverse striations in addition to hair punctures; hairs inconspicuous, black; scutellum bluish to violet, without transverse striae, with inconspicuous black hairs; underside of apex and sides of scutellum and supraalar regions yellowish. Humeri yellowish. Pleura mostly blackish; a narrow white margin from humerus to wing base; a small whitish spot on upper posterior part of metapleuron; pile white, semi-erect above, appressed below. Metanotum green, mostly bare and very glossy but with some whitish hairs below. Squamae whitish, white haired. Halteres yellow. Wings lightly infuscated, especially on apical half; stigma black; veins mostly black, those near wing base yellow. Legs mostly yellow; bases of middle and hind coxae and indefinite areas covering approximately second half of middle and hind femora, except apices, blackish; hind tibia tending to whitish; pile of legs whitish to yellow, becoming black at apices of tarsi.

Abdomen black, with blue to violet reflections in certain lights; with inconspicuous appressed black hairs on terga and on fifth sternum, appressed whitish hairs on other sterna, and some whitish hairs on first tergum and at tergal incisures. Length, 5.5 to 9.5 mm.

Male: Eyes contiguous for about half distance from anterior ocellus to antennae; frontal triangle and occiput black; face yellow; pile behind ocelli and on face yellow, otherwise white. Pile of mesonotum tomentum-like, brassy, conspicuous when viewed in proper lights. Margin of scutellum, supraalar and postalar areas, and upper parts of pleura yellow; pleura below (pectus) and metapleura in part black; metapleuron with a whitish spot as in female. Legs wholly yellow. Wing infuscation not as evident as in female; veins extensively yellow; stigma rather indistinctly yellow. Abdomen yellow, with anterior corners of first tergum blackish and with black transverse sub-basal bands on terga 2 to 5 inclusively; these bands usually interrupted on tergum 2 and sometimes on 3; blackish color rather indefinitely limited, but on tergum 2 it shows distinct bluish to violet reflections in certain lights. Genitalia yellow, of same general structure as in *C. chrysidiformis* (fig. 1, *d*); yellow, hairs yellow above, black below.

Holotype, female (US 66287), Arno Atoll, Ine Island, Marshall Islands, June 22, 1950, La Rivers. Allotype, male, Kusaie, Hill 541, 165 m., Caroline Islands, light trap, March 23, 1953, Clarke. Paratypes, 13 females, 43 males, with distribution as follows:

Ponape. One female, Colonia (Kolonia), Jan. 1, 1938, Esaki.

Kusaie. One male, Pukusrik, 1 m., Feb. 13, 1953, Clarke; four males, Hill 1010, Apr. 16, 1953, and light trap, Mar. 25 and Apr. 13, 1953, 165 m., Clarke; 12 males, four females, Lele (Lelo, Lelu), Dec. 2 and 4, 1937, Esaki, July 23, 1949, Owen, and Feb. 18, 1953, Clarke; 17 males, Mutunlik, 16 m., light trap, Jan. 23, 1953, at light, Apr. 30, 1953, Feb. 8, 1953, and 22 m., Feb. 6, 15 and 16 and Mar. 21, 1953, Clarke; two males, Hill 541, at light, Apr. 29, 1953, Clarke; two females, one male, Malem, Dec. 1 and 14, 1937, Esaki; three males, Malem River, 30 m., Apr. 17, 1953, Clarke.

Marshall Is. Ailinglapalap: One female, Woja (Wotja) I., Nov. 20, 1948, Langford; one male, Bikajela (Bigatyelang) I., Nov. 11, 1948, Langford. Jaluit: One male, Jabuar (Jabor), Apr. 24, 1958, Gressitt; one male, Mejetto (Medjado), Aug. 24, 1946, Clarke. Ebon: One female, Ebon I., Sept. 27, 1953, Beardsley. Arno: Four females, Ine I., June 17, July 25, and July 31, La Rivers.

DISTRIBUTION: E. Caroline Is., Marshall Is.

3. **Cephalochrysa nigra** James, n. sp. (fig. 2, *a*).

Female. Front almost parallel-sided, narrowing somewhat from vertex to antennal base; face almost parallel-sided, a little narrower than front. Front, vertex, and occiput black, front with dull bluish reflections in certain lights and with shallowly impressed but distinct longitudinal striae which bow outward from mid-frontal suture toward ocular orbits; frontal callus distinctly biarcuate above, a dirty ivory in color above and becoming yellowish below and on face, middle of face brownish. Pile of head inconspicuous except on cheeks, brownish to brownish yellow. Antenna brownish yellow, first and second segments and arista brown; pile black. Proboscis brownish yellow with brownish to yellowish hairs. Head measurements of holotype, in micrometer units (60 = 1 mm): head width, 160; maximum width of front, 48; front at frontal callus, 41; face below antenna, 36.

Thorax almost entirely black, humeri, postalar calli, under side of scutellum, upper margins of sternopleura, posterior half of pteropleura, and parts of propleura and metapleural slopes brownish; mesonotum with traces of bluish reflections under certain lights. Pile black, inconspicuous, appressed on mesonotum and scutellum except margins and on lower parts of pleura (pectus), otherwise semi-erect. Halteres brownish, knobs more blackened. Squamae dusky, black-haired. Wings strongly infuscated. Legs mostly yellow; trochanters, apices of femora, front tibia, apical half of middle tibia, extreme apex of hind tibia, and front and middle tarsi, brownish black. Pile inconspicuous, blackish, tending to yellow on ventral sides of segments and on front tibia and basal three front tarsomeres.

Abdomen black, shining; venter with reddish-brown reflections; pile black, fairly

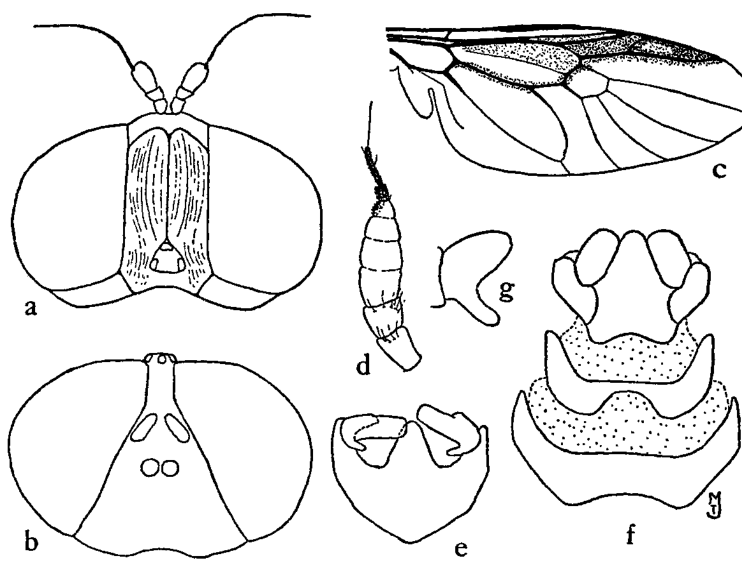


FIGURE 2.—**a**, *Cephalochrysa nigra,* head of female, dorsal view, setae and hairs omitted. **b-f**, *Brachycara grandis: b,* male, outline of head, anterior view, antennae omitted; *c,* wing; *d,* antenna; *e,* male genitalia, ventral view, setae and hairs omitted; *f,* male, terminal abdominal segments, dorsal view, setae and hairs omitted. **g**, *B. ventralis,* outline of male forceps.

dense but inconspicuous, mostly appressed, that on sides of first tergum long and semi-erect. Postabdominal segments black, black-haired. Length, 7.5 to 8 mm.

Male. (Somewhat teneral). Head structurally very much as in *C. rugulosa,* entirely black and black-haired except for some inconspicuous yellowish pile on cheek. Mesonotum black; pile reddish brown medially, appressed, that of mesonotum and pleura yellow. Squamae yellowish with dusky hairs. Abdomen probably mostly black; pile black.

Holotype, female (US 66288), Colonia, Ponape, June-Sept., 1950, Adams. Allotype, male (KU), Dolen Eireke, Nanipil (Sankakuyama, Nampir), Ponape, Jan. 4, 1938, Esaki. Paratype, female, same data as allotype but Jan. 3.

DISTRIBUTION: Caroline Is. (Ponape).

4. Cephalochrysa infuscata James.

Cephalochrysa infuscata James, 1950, Pacific Science **4**: 186.

This species is close to *C. chrysidiformis* (Lindner), from which it is distinguished chiefly by color characters: the solid green or blue of the abdominal terga of the male, the more extensively black legs, and the infumated wings. The finely punctured front of the female contrasts with the coarsely punctured front of *gracilis,* the striated front of *C. nigra,* and the heavily rugulose front of *C. rugulosa.*

DISTRIBUTION: Mariana Is.

N. MARIANA IS. AGRIHAN: Male, July 26, 1951, R. M. Bohart.

S. MARIANA IS. SAIPAN: Female, Mt. Tagpochau, 375 m., Feb. 18, 1945, Dybas. ROTA: Female, Teteto, Nov. 8, 1937, Esaki. GUAM: 11 females, three males, Mt. Alifan, May 26, 1936, Usinger; Piti, July 27 and Sept. 21, 1936, Swezey; no data, Fullaway.

5. Cephalochrysa chrysidiformis (Lindner). (Figure 1, *d.*)

Microchrysa chrysidiformis Lindner, 1937, Ann. Mag. Nat. Hist., X, **20**: 373.

Cephalochrysa chrysidiformis (Lindner), James, 1948, U. S. Nat. Mus., Proc. **98**: 198.

Male: Eyes contiguous, clearly divided into zones of upper and lower facets; frontal triangle extending slightly above upper limits of zone of smaller facets, vertical triangle extending below anterior ocellus by a distance about equal to length of ocellar triangle and produced into a very narrow apex. Front and face subshining black, proboscis yellow. Pile of head inconspicuous, whitish.

Mesonotum and scutellum metallic blue to green, color varying with light incidence, strongly shining; mesonotum punctate at bases of hairs and in addition transversely striated; pile tomentum-like, brassy medially, whitish laterally, clearly evident under proper lighting but not conspicuous; humeri, postalar calli and immediately adjacent areas, and borders of scutellum apically and below, yellowish. Pteropleura, mesopleura except blackish area occupying upper anterior portion, and upper margins of sternopleura yellow; pleura otherwise blackish. Metanotum metallic green, striate but not punctate. Wing subhyaline, stigmatal area somewhat darkened. Legs mainly yellow; hind femur with a blackish annulus covering approximately third quarter; traces of a similar band on middle femur; hind tibia paler than remainder of legs, almost white.

Abdomen black with purple reflections medially and green reflections laterally, but with approximately median half of first three terga and with first three sterna and parts of fourth yellow. Genitalia bright yellow. Length, 7 to 8 mm.

Female: Front, vertex, occipital orbits, mesonotum, metanotum, and abdominal terga highly shining green to purple or violet, thorax tending more to green and sometimes contrasting distinctly with abdomen; pleura and venter black; middle and hind femora black on apical half or more, and front femora sometimes partly blackened; antennal flagellum brownish yellow to blackish. Hind tarsi may or may not be blackened.

DISTRIBUTION: Solomon Is., New Hebrides, Caroline Is. (Truk).

TRUK. 16 males, 92 females. WENA (Moen): Civ. Ad. Area and Mt. Tonaachau, Feb. 13 to Apr. 24, 1949, Potts. TON (Tol): Oly-Foup, Apr. 11, 1940, Yasumatsu and Yoshimura.

This species was described from females only, and to the present time

males have been unknown. It is very close to *C. maxima* (Bezzi); I can find no reliable character for separating the females, and the males differ only in the color of the abdomen. *C. maxima* is more eastern in its distribution (Fiji, Samoa, Hawaii) than is *C. chrysidiformis* (Solomon Islands, New Hebrides, Caroline Is.).

Genus **Microchrysa** Loew

Microchrysa Loew, 1855, Zool.-bot. Ver. Wien, Verhandl. **5**: 142.

This genus, widespread throughout most of the tropical and warmer temperate regions of the world except Australia, contains the smallest of the Sarginae. Several species are sexually dichromatous, that is, the female has a metallic blue or green abdomen, concolorous with most of the rest of the body, whereas the abdomen of the male is chiefly or wholly yellow. James (1950) has presented a key to separate the three species of this group that occur in Oriental and South Pacific island regions.

6. Microchrysa flaviventris (Wiedemann).

Sargus flaviventris Wiedemann, 1824, Analecta Ent., 31.

Vein forming upper border of discal cell, that is vein M_{1+2} from crossvein r-m to its furcation, very feebly developed, almost evanescent; abdomen of female metallic blue or green, that of male yellow with a transverse black spot on fifth tergum; legs yellow with black annulus each on hind femur and hind tibia, that on femur sometimes quite extensive so as to cover half or more of segment.

DISTRIBUTION: Oriental region in general; Japan, Okinawa, New Guinea, New Caledonia, Mariana Is., Caroline Is.

S. MARIANA IS. SAIPAN: Female, no locality, Nov. 22, 1944, Hagen; female, 1.9 km. east of Tanapag, Nov. 17, 1944, Dybas; male, Matansa (Matansha), Apr. 26, 1946, Krauss; five males, Matansa (Matansha)-Kalabera (Calabera), May 8, 1940, Yasumatsu and Yoshimura. TINIAN: Female, Mt. Lasso, northwest slope, Mar. 17, 1944, Dybas. GUAM: Three females, two males, Pt. Oca, May 30, at light, June 5, and June 14, 1945, Bohart and Gressitt, Dybas; eight females, 14 males, Piti, July 27 to Nov. 6, 1936, on *Glochidion,* swept from bamboo and *Pithecellobium,* beaten from *Citrus,* and at light, Swezey; female, two males, Inarajan, July 25, 1936, *Pithecellobium dulce,* Swezey, and Oct., 1957, Krauss; male, Dairy Island Farm, Nov. 28, 1945, G. Bohart; male, southeast coast, May 9, 1945, Bohart and Gressitt; male, Pilgo River, May 26, 1945, Bohart and Gressitt; four females, two males, no data.

PALAU IS. KOROR: Nine females, eight males, at light, Aug. 12, 1952, to May 10, 1953, Beardsley, and Apr. 13 to May 29, 1957, Sabrosky.

YAP. Kolonia: Male, July-Aug., 1950, Goss; four males, no locality, Oct., 1952, Krauss.

PONAPE. Colonia (Kolonia): Female, Dec. 31, 1937, Esaki; male, at light, Sept. 4, 1952, Beardsley.

KUSAIE. Mutunlik: Female, Feb. 6, 1953, Clarke.

Subfamily Clitellariinae

Genus **Brachycara** Thomson

Brachycara Thomson, 1869, Eugenies Resa, Diptera, 460.

The five species which are referable to this genus, including one described below as new, seem to form a fairly compact group. They are readily separable from one another by quite clear characters, and the males differ markedly from one another in the structure of the genitalia. It is interesting to note that all species are insular in distribution and are confined to the northern parts of the tropics in both hemispheres.

Key to the known species of Brachycara

1. Wing strongly infumated along costal margin, most noticeably in cells R_1, R_3, and R_4; second, third, and fourth terga of male ivory colored, with small black side markings, same terga of female black, with small ivory side markings; eyes of male broadly separated .... **7. grandis**
   Distinct wing infumation limited to cell R_1 (stigma); eyes of male contiguous 2

2(1). Second, third, and fourth terga of male white to ivory with black side markings, those of female black to reddish black, with white side markings (Bahama Is.) .... **maculata** (James)
   Abdomen yellow to black, without clearly defined patterns 3

3(2). Cell M (second basal) devoid of microtrichia over most of its extent; eyes of male hairy 4
   Cell M uniformly clothed with microtrichia over most of its extent; eyes of male bare .... **8. ventralis**

4(3). Front wholly black in both sexes; femora blackish (Hawaii) .... **latifrons** James
   Front with ivory to whitish calli in female and with a pair of whitish to ivory spots in male; femora yellow (Florida, West Indies) .... **slossonae** (Johnson)

7. **Brachycara grandis** James, n. sp. (fig. 2, *b-f*).

Male: Body relatively slender. Head black, subshining; a pair of narrowly separated ivory spots on frontal triangle. Eyes bare, distinctly separated, front on upper part almost parallel-sided but slightly widening toward ocellar triangle. Head measurements in micrometer units (60 = 1 mm): head width, 117; head height, 75; minimum width of front, 10; front at anterior ocellus, 11. Pile silvery, inconspicuous on front, conspicuous on face, cheeks, and occipital orbits. Antenna yellow, flagellum tapering to a blackish, two-annulated style which bears several short setae and terminates in a seta approximately as long as last annulus of style; first and second antennal segments with some short black setae; style and inner surface of fourth flagellar annulus micropubescent. Proboscis brown.

Thorax black except that humerus and a narrow stripe to wing base are ivory; pile silvery; in addition some very short underlying stiff black pile on mesonotum visible only under certain lights. Stems of halteres yellowish, knobs white. Middle tarsus yellow, legs otherwise black and black-haired; all femora thickened, but fore and particularly hind femora much thicker than middle pair; hind tibia thickened, as broad as middle femur, and curved; hind basitarsus thicker than remaining tarsomeres. Squamae white, white-haired. Wing with costal margin somewhat bowed outward; vein C thickened half way or more from crossvein r-m toward crossvein h; wing heavily infumated along costal margin; veins strong and black from anterior margin to discal cell, weak on posterior

half of the wing; microtrichia absent from large part of wing base, from cell M except along its margins, and from most of basal half of cells 1st A and 2nd A.

Abdomen white, following areas black: first and fifth terga; broad anterior margins on anterior half of second tergum, a square at each anterolateral corner of third and extending a little more than half way to apex, and a rectangle of equal width on anterolateral margin of fourth but extending about three-fourths way to apex; lateral and apical margins of venter, including entire fifth sternum, margins interrupted at incisures between second and third and third and fourth sterna; and genitalia. Pile of abdomen white, some short black pile laterally and apically.

Genitalia small, median ventral plate undivided, extending under aedeagus; aedeagus three-pronged, lateral guards well separated from intromittent organ; forceps flattened, their main portion almost rectangular, with a closely appressed dorsal piece and a digitate ventral process apically. Cerci broadly oval. Length, 8 mm.

Female: Width of front in micrometer units 26, head width 90. Front almost parallel-sided above callus; callus in form of two ivory, triangular spots touching adjacent eye and separated from each other by about length of one spot. Femora thickened, but front and hind femora not noticeably thicker than middle pair; hind basitarsus not thickened. Microtrichia in cell M more abundant than in male, but basal half of cell with only scattered microtrichia except near veins. Abdomen black with small rectangular ivory spots, broader along incisures than along lateral margins, on each apical corner of terga 2, 3, and 4. Otherwise, except sexually, as described for the male. Length, 6 mm.

Holotype, male (US 66289), Mutunlik, Kusaie, Feb. 3, 1953, Clarke. Allotype, female, same data but Apr. 1, 1953, beach.

DISTRIBUTION: E. Caroline Is. (Kusaie).

8. **Brachycara ventralis** Thomson (fig. 2, *g*).

Brachycara ventralis Thomson, 1869, Eugenies Resa, 460.

Considerable variation in color occurs. The paler form, corresponding well with that described by Thomson, has legs yellow, except hind tibia and sometimes tarsi may be darkened; abdomen entirely yellow to yellowish brown, sometimes with blackish base and blackish transverse band on fifth tergum; antenna yellowish brown on basal annuli of flagellum, otherwise dark brown. In the darker form, legs, abdomen, and antennae may be darkened so that all three are predominantly brown or blackish brown. Darkening of legs and abdomen are correlated to an extent, although a series with a pale abdomen may have both light- and dark-legged forms; darkening more prevalent in females, but light-colored females and dark-colored males may occur.

Male genitalia distinctive: ventral plate undivided and forceps bear a ventral digitate process, as in *B. grandis;* forceps, however, little if any longer than broad, rounded apically; digitate process usually long, about as long as main lobe of forceps, curving ventrally toward its fellow on the other forceps.

DISTRIBUTION: Andaman Is., Seychelles Is., Cocos (Keeling) Is., New Guinea, S. Mariana Is., Caroline Is., Marshall Is., Gilbert Is.

S. MARIANA IS. SAIPAN: Male, Afenia-Chalan Kanoa (Charanka), July 4, 1939, Esaki. GUAM: Female, male, Cocos I., Oct., 1957, Krauss.

PALAU. BABELTHUAP: Three males, Ngerehelong, May 6-7, 1957, Sabrosky; three females, nine males, Ulimang, Dec. 19, 1957, Dybas; male, Melekeiok, beach, May 23, 1957, Sabrosky. ANGAUR: Female, three males, Feb. 5, 1948, Dybas, and May 1, 1954, Beardsley. NGESEBUS: Female, May 29, 1957, Sabrosky.

YAP. Kolonia: Two females, two males, July-Aug., 1950, Goss. RUMUNG

I.: female, two males, at light, June 17, 1957, Sabrosky; Ruul District: male, July-Aug., 1950, Goss. GACHAPAR (Gatzapar): Female, Sept. 1, 1939, Esaki. YAP: Male, Oct., 1957, Krauss.

KUSAIE. Mutunlik: Four females, two males, 22 m., Feb. 6-17, 1953, Clarke.

CAROLINE ATOLLS. MERIR: Female, Sept. 11, 1952, Krauss. NGULU: Four females, male, Oct. 3, 1952, Krauss. ULITHI: Female, Asor I., Oct. 6, 1952, Krauss. WOLEAI: Two males, Utagal, Sept. 2, 1952, Krauss. EAST FAYU: Two females, Oct. 25, 1952, Beardsley. NAMOLUK: Female, Namoluk I., Nov. 1, 1952, Beardsley. NOMWIN: Two males, Nomwin I., Feb. 17-18, 1954, Beardsley.

MARSHALL IS. ARNO: Five males, Ine I., July 12, 1950, La Rivers; female, Arno I., July 19, 1950, La Rivers. JALUIT: Five males, Jabor I., Apr. 24 to May 1, 1958, Gressitt. MAJURO: Two females, male, Ulika (Uliga) I., Sept. 24, 1953, Beardsley. AILINGLAPALAP: Male, Ailinglapalap I., Oct. 26, 1953, Beardsley. ENIWETOK: Male, Jobtan (Japtan), May 17, 1946, Townes. UJAE: Male, Bock I., Feb. 16, 1952, Fosberg, No. 895.

GILBERT IS. TARAWA: Two females, Bairiki I., Nov., 1959, Krauss.

Though I have seen no material from the type locality (Ross I. = Andaman Is.), the form from Micronesia seems to be *B. ventralis*.

In the two males from Woleai Atoll the forceps are longer and more pointed, with short processes. It is possible that another species is involved, but the genitalic differences are probably a part of the pattern of variability that is found in this species. The Woleai specimens represent the pale form, but other pale, as well as darker, males have the more usual type of forceps.

SUBFAMILY HERMETIINAE

Genus **Hermetia** Latreille

Hermetia Latreille, 1804, Nouv. Dict. d'Hist. Nat. **24**: 192.

9. Hermetia illucens (Linnaeus).

Musca illucens Linnaeus, 1758, Syst. Nat. ed. 10, 589.

Elongated, mainly black, with strongly infumated wings and a pair of translucent spots on second abdominal segment; antennae, with their long, broad, vane-like style, extend forward prominently. Length 12 mm, usually more.

DISTRIBUTION: Warm temperate regions, subtropics, and tropics of the world, particularly the Americas; all continents except Antarctica, and many island areas.

BONIN IS. CHICHI JIMA, 17 females, four males: Omura, Apr. 2 to June 9, 1958, Snyder; "Yankee Town," May 12 to June 9, 1958, Snyder; Yoaka Yama, Apr. 21, 1958, Snyder; Jack Williams Beach, Apr. 15 to 21, 1958, Snyder.

S. MARIANA IS. SAIPAN: Female, male, Aug. 28, 1951, R. Bohart. Tinian: Female, Feb., 1958, Krauss. ROTA: Female, June 18, 1951, R. Bohart. GUAM: four females, three males, Agana, July 1 and 15, Sept. 18, 1945, Wallace; Oca-Tumon, Nov. 26, 1952, Gressitt; Yona, Oct., 1952, Krauss.

PALAU IS. KOROR: 11 females, five males, throughout the year, various collectors. ANGAUR: Male, Feb. 3, 1948, Dybas. BABELTHUAP, two females, two males: Melekeiok, May 24, 1957, Sabrosky; Ngerehelong, May 6, 1957, Sabrosky; Ngeremetengel (Ngeremlengui), June 4, 1957, Sabrosky. PELELIU: Female, Amiangal Mt., Dec. 23, 1952, Gressitt. KAYANGEL (Ngajangel): Male, Ngariungs I., Dec. 15, 1952, Gressitt. NGURUKDABEL (Urukthapel) I., July 12, 1949, Kondo.

TRUK. WENA (Moen): Female, Feb. 19, 1945, Dybas; 11 females, Civil Ad. Area, Feb. 5 to Apr. 24, 1949, Potts.

PONAPE. Colonia: Three females, four males, Jan. to Sept., various collectors. Wineh (Winuh), female, June to Sept., 1950, Adams.

CAROLINE ATOLLS. IFALUK: Male, Ifalik I., on *Wedelia* on east beach of Falarik, Sept. 11, 1953, Bates. KAPINGAMARANGI: Male, Touhou I., on porch at night, Aug. 5, 1954, Niering.

MARSHALL IS. KWAJALEIN: Male, Ebeye I., Sept. 11, 1956, Clagg. MAJURO: Female, male, Ulika (Uliga) I., Oct. 10 and Sept. 6-7, 1953, Beardsley. ARNO: Seven females, seven males, Ine I., June 12 to Aug. 5, 1950, La Rivers, Usinger; Takleb (Tagelib) I., June 29, 1950, La Rivers, one pair in copula. JALUIT: Female, Jabor I., May 1, 1958, Gressitt. RONGELAP: Male, Dec. 18, 1954, J. J. Davis.

GILBERT IS. TARAWA: Six females, eight males, Bairiki I., Nov. and Dec., 1957, Krauss.

The larvae breed in excrement, decaying and waste vegetable and animal material, the wax in beehives, and perhaps other media; they are common in outdoor privies in many areas and have been recorded in human enteric myiasis. An American species, *H. illucens* has become widely distributed in the tropics, subtropics, and warmer temperate regions of the Old World during recent years. It is the largest Micronesian stratiomyid.

SUBFAMILY PACHYGASTERINAE

Genus **Artemita** Walker

Artemita Walker, 1854, List. Dipt. Ins. Brit. Mus., 5, 61.

The genus *Artemita* has until now been considered strictly neotropical in its distribution. The related genus *Cibotogaster* Enderlein, 1914, consists of a small group of species from the Oriental region and New Guinea. Kertész (1914) separates *Cibotogaster* from *Artemita* on the basis of its metallic blue,

rather than black, coloration, the presence of sensoria on the first five annuli of the flagellum, rather than on only the first three, the much closer fusion of the abdominal tergites, and some minor characters. The species described here does not fit the diagnosis of either genus, but certainly it belongs in one or the other, unless one should wish to split genera in this complex needlessly. The lack of a definite wing pattern such as is found in most species of *Artemita* and the presence of sensoria on the first five flagellar annuli would tend to place it in *Cibotogaster,* but other characters agree better with *Artemita.* The best disposition is to consider it an aberrant *Artemita,* both in structure and distribution.

10. **Artemita insularis** James, n. sp. (fig. 3).

Male: Almost wholly black, only proboscis in part, small keel immediately behind humerus, sclerites at wing base, tips of scutellar spines, middle tarsi, extreme apices of coxae, femora, tibiae, and remaining tarsomeres, extreme bases of tibiae, very narrow margin of fifth abdominal segment, and genitalia, yellow to reddish yellow; halteres a dusky cream color.

Eyes contiguous, densely black haired; vertical triangle, including ocellar triangle, shining, with a very narrow silvery-pollinose occipital orbit; frontal triangle callus-like, shining, with a distinct median longitudinal furrow which extends to antennal bases and which, along with very narrow occipital orbits, is silvery pollinose; face whitish tomentose; cheeks and lower occiput shining, with moderately thick, mostly whitish hairs but with a few black intermixed; upper part of occiput whitish tomentose. Occipital orbits narrow, about as wide as diameter of an ocellus, but distinct throughout, sharply keeled posteriorly. Antenna shorter than in most members of this genus and peculiar in form; first five annuli of flagellum forming a spindleshaped complex, pollinose and with sensoria on basal annulus and anteriorly on others, posteriorly on annuli 2 to 5 inclusively with a very dense mat of stiff, erect, yellowish hairs; sixth and seventh annuli short, eighth large, terminating in three or four short erect hairs.

Vestiture of mesonotum apparently variable but consisting of (1) appressed whitish and reddish yellow pile, latter forming an indefinite median stripe and two lateral areas interrupted at suture and not reaching scutellum; and (2) scattered, erect, stiff black hairs, best visible from behind. Scutellum with appressed and some semi-erect whitish pile. Pleura and legs mostly with whitish hairs. Wings uniformly lightly infuscated, almost uniformly clothed with microtrichia except at extreme base, along vein 2nd A, along vein Cu in anal cell, and along vein Sc in basal half of costal cell.

Abdomen with whitish, appressed, tomentum-like pile dorsally and ventrally and with some suberect whitish pile basally, particularly at sides; also with numerous very short black suberect hairs which can be seen only under high magnification and when viewed posteriorly. Genitalia yellow; forceps broad at base, with fingerlike apices which, when viewed dorsolaterally, appear clawlike; aedeagus bifid, two guards spoonlike, distinctly concave ventrally on broadened portions. Cerci broad, truncated apically. Length, 6-6.5 mm.

Female. Front parallel-sided, narrow, 0.11 head width; shining and bare just in front of antennae and on callus, otherwise subshining and with short, erect whitish hairs. Pile of eyes whitish, shorter than in male. Occipital orbits about half width of front. Median groove of callus broader and more prominent than in male. Vestiture of thorax and abdomen as in male, except that, on mesonotum, reddish pile becomes black, median stripe extends onto basal part of scutellum, and whitish pile becomes yellowish. Fifth abdominal segment wholly black; posterior third of tergum in lateral profile forming an angle of about 120° with rest of tergum. Genital segments brownish.

Holotype, male (US 66290), Yoake Yama, Chichi Jima, Bonin Islands,

Apr. 21, 1958, Snyder. Allotype, female, Haha Jima: Okimura, Apr. 26 to May 9, 1958, Snyder. Paratype, male, same data as holotype.

DISTRIBUTION: Bonin Is.

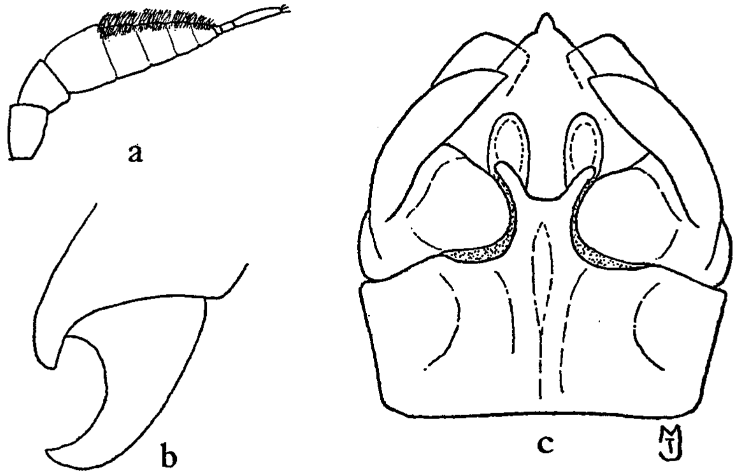


FIGURE 3.—*Artemita insularis:* **a**, antenna, setae on basal segments omitted; **b**, outline of male forceps, dorsolateral view; **c**, male genitalia, ventral view, setae and hairs omitted.

Genus **Tinda** Walker

Tinda Walker, 1860, Linn. Soc. London, Proc. **4**: 101.—Kertész, 1914, Nat. Mus. Hungarici, Ann. **12**: 449-456 (key).

Considerable confusion has existed as to the identity of the two common species of Oriental *Tinda, T. indica* (Walker) and *T. javana* (Macquart). These nominal species have been considered as synonymous by some authors and as separate by others. Kertész essentially clarified the situation, although he did not proceed far enough in his differentiation. The two are good species, and I find the following points of differentiation between them:

T. javana (Walker): Eyes more elongated in both sexes, ventral convexity of male, in lateral view, not markedly different from the dorsal. Vertical triangle of male shining, not at all pollinose; front of female shining above callus and with a slight concavity but no distinct depression there; a shining triangle, broader at base than an ocellus, reaching from apex of ocellar triangle about half way to callus; front silvery tomentose between callus and antenna. Legs yellow.

T. indica (Macquart): Eyes more nearly rounded from lateral view, ventral convexity of male distinctly more pronounced than dorsal; vertical triangle of male subshining through thin but distinct pollen; front of female subshining above callus and with a distinct depression; at most a small shining area in front of anterior ocellus; front with a pair of silvery-tomentose spots, separated along mid-frontal suture; middle and hind femora largely brown or brownish.

11. Tinda javana (Macquart). (Figure 4, *a, b.*)
Beris javana Macquart, 1839, Dipt. Éxot. **1** (2) : 188.

DISTRIBUTION: Mauritius; Ceylon; Malaya; East Indies; Bonin Is.; Volcano Is.

BONIN IS. MUKO JIMA: Two females, four males, Muko Jima (Muko I.), July 17, 1951, R. Bohart. CHICHI JIMA: 14 females, 28 males, Okumura, "Yankee Town" and "Camp Beach," May 5 to June 9, 1958, Snyder and W. Mitchell; Sakai-ura, July 4, 1949, Mead, and "Bull Beach," Apr. 5 to 25, 1958, Snyder; Futami-ko, May 10, 1956, Clagg; Ogiura, Apr. 8 to May 12, 1958, Snyder; Tsurihama, June 23, 1949, Mead; Yoake Yama, Apr. 21, 1958, Snyder; Miyanohama, June 22, 1949, Mead. HAHA JIMA: Four females, 13 males, Okimura, Apr. 26 to June 9, 1958, Snyder.

VOLCANO IS. IWO JIMA: Two females, male, Sept. 1-5, 1945, Dybas.

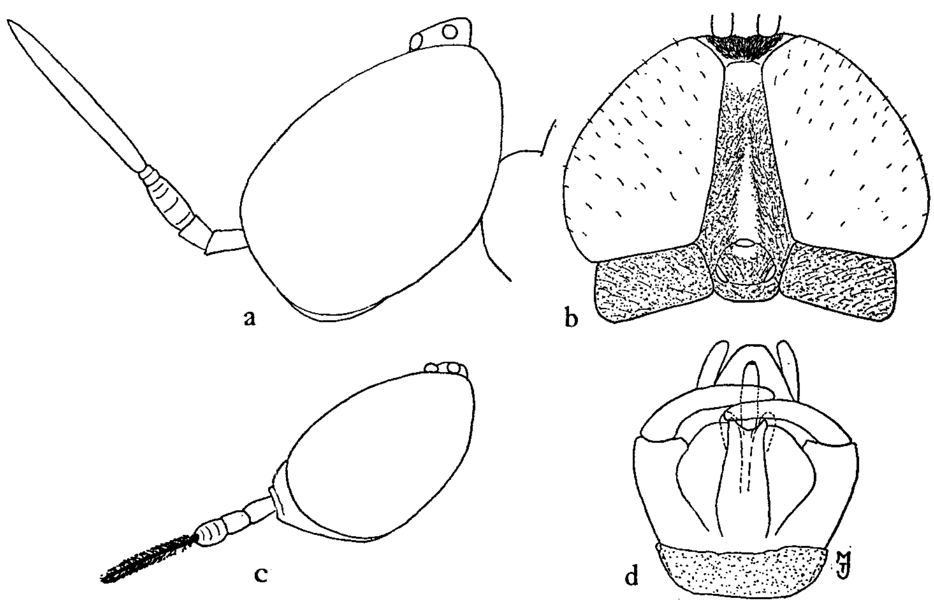


FIGURE 4.—**a, b,** *Tinda javana: a,* head and antenna of male, outline, lateral view; *b,* head of female, dorsal view. **c,** *Trichochaeta recedens,* head and antenna of male, outline, lateral view. **d,** *Evaza discalis,* male genitalia, ventral view, setae and hairs omitted.

Genus **Evaza** Walker

Evaza Walker, 1857, Linn. Soc. London, Jour. Proc. **1**: 109.—Brunetti, 1923, Indian Mus., Rec. **25**: 75-79 (includes key to Oriental species).

This genus is very close to *Tinda* but can be readily distinguished by the bare or micropubescent arista; I know of no intergradation in the antennal structure. As Brunetti remarks, there may be some question as to the validity of some of the Oriental species; they form a very close complex and some of them are distinguished from one another by insignificant characters. One form, apparently new, occurs in Micronesia.

12. **Evaza discalis** James, n. sp. (fig. 4, *d*).

Female. Front at upper angle of eyes 0.25 head width, narrowing to 0.10 head width at a plane about 0.20 head width above plane of antennal insertion, thence broadening abruptly; occipital orbit at broadest (above) about equal to front at narrowest. Head black, shining on vertex, occiput, and most of front; lower part of front, below constriction, with a triangular, silvery-tomentose area, contiguous with silvery-tomentose facial orbits. Cheeks and face with some whitish hair. Antenna yellow, with yellow hair; arista black. Terminal segment of palpus blackish; palpi and proboscis otherwise yellow, with yellow hair.

Thorax mostly black; humeri yellow; supraalar areas and areas immediately below wing bases yellowish; scutellum broadly yellowish laterally and apically, apex and spines becoming whitish, only disc black. Mesopleura largely shining above. Pile of thorax silvery laterally, slightly yellowish dorsally, mostly appressed. Legs mostly yellow; fore tibia infuscated; fore tarsus wholly black. Pile of legs whitish. Wings blackish along costal margin and at apex, otherwise subhyaline, uniformly set with microtrichia except at extreme base. Halter yellow, with knob infuscated.

Abdomen black, more or less reddish under certain lights; pile of terga black, that of sterna whitish to yellowish. Length, 6 mm.

Male. Eyes contiguous. Pollinose areas of front taking up most of frontal triangle except its upper angle. Genitalia yellow, yellow-haired; forceps about 2.5 as long as wide, parallel-sided, rounded apically, overlapping each other; aedeagus three-pronged, intromittent organ prominent, tubular, lightly sclerotized; guards broad, lightly sclerotized, broadly rounded apically. Otherwise, except sexually, as described for female.

Holotype, female (CM), Peleliu I., east coast, Palau, Aug. 1, 1945, Dybas. Allotype, male, same data. Paratypes, 24 females, 35 males, with distribution as follows:

Palau Is. Female, no locality (Pelew), 1935, Yoshino. Ngaiangl: Four males, Ngaiangl (Kayangel) I., Dec. 15, 1952, light trap, Gressitt. Babelthuap: Male, female, Ngerehelong, May 6, 1957, Sabrosky; female, Ulimang, Dec. 19, 1947, Dybas; two males, Melekeiok, May 23, 1957, Sabrosky; male, Ngaremlengui, Apr. 4, 1957, Sabrosky; three males, Ngiwal, May 20, 1957, at light, Sabrosky, July 21, 1946, Townes, and Nov. 18, 1951, Gressitt; male, Ngardmau, May 10, 1957, Sabrosky; two females, Imeliik (Eimilik)-Ngaremeskang (Ngarumisukan), Aug. 18, 1939, Esaki; E. Ngatpang, male, July 10, 1952, Gressitt, and male, Dec. 9, 1952, Gressitt. Koror: 10 females, nine males, Apr. 19, 22, 24, 25, 26, May 2, 27, and 30, 1957, some at light, Sabrosky; male, Dec. 2, 1947, Dybas; two males, Apr.-May, 1949, Langford; five females, four

males, at light, Aug. 19, 20, Sept. 10, Oct. 5, Nov. 20, 1953, Beardsley; male, 25 m., at light, Dec. 18, 1952, Gressitt; male, July 17, 1946, Townes; female, Ngarbaged (Anabaketsu), June 11, 1939, S. Miyake. Ngarmalk: Male, at light, Apr. 23, 1957, Sabrosky. Ngaremediu: Male, Ngurukdabel I., Apr. 24, 1957, Sabrosky. Peleliu: Three females, same data as holotype; male, north central, July 31, 1945, Dybas.

DISTRIBUTION: Palau Is.

In Brunetti's key this species traces to couplet 14, but the coloration of the legs and scutellum will readily distinguish it from both species that key to that couplet (*E. maculifera* de Meijere, *E. indica* Kertész). It is related to *E. scenopinoides* (Walker), from which it may be distinguished by the infuscated fore tibiae, the more extensively yellow scutellum, and the broader front of the female (front at minimum, 0.05 head width in *E. scenopinoides*). The male genitalia are closely similar to those of *E. scenopinoides.*

13. Evaza (?) sp.

One female, Imeliik (Aimeliik), Babelthuap, Palau Is., Aug. 26, 1953, Beardsley, is tentatively referred to an unknown and rather surprising species of this genus. The specimen is in bad condition; the antennae lack aristae except the base of one, the hind legs and most of the abdomen are missing, and the wings are folded posteriorly. From what remains of the specimen, I would refer it to *Evaza* without hesitation except that the scutellum has only two spines, located in the position of the lateral spines of a usual *Evaza.* The middle pair of spines is not broken off; there is no evidence that they were ever present. The differences between this specimen and *E. discalis* are too great to warrant the assumption that this is an abnormal specimen of that species.

Genus **Trichochaeta** Bigot

Trichochaeta Bigot, 1878, Soc. Ent. France, Ann. Bull. V, **8**: xxii.—Kertész, 1908, Mus. Nat. Hungarici, Ann. **6**: 339.—Brunetti, 1923, Indian Mus., Rec. **25**: 80.

Kertész has discussed the genus and its three nominate species, *T. recedens* (Walker, 1861), *T. scapularis* (Walker, 1861), and *T. nemoteloides* Bigot, 1878, which Brunetti has shown to be synonyms, with *T. recedens* holding priority. The genus is easily recognized by the *Tinda*- or *Evaza*-like appearance, plus its produced face and rather thick, densely pilose arista.

14. Trichochaeta recedens (Walker) (fig. 4, *c*).

Tinda recedens Walker, 1861, Linn. Soc. London, Proc. **5**: 233.

DISTRIBUTION: New Guinea, Molucca Is., Philippine Is., Palau Is.

PALAU IS. BABELTHUAP: Male, Ngatpang, Dec. 9, 1952, Gressitt. KOROR: Female, at light, Nov. 25, 1953, Beardsley; male, Dec., 1953, Beardsley.

Genus **Rosapha** Walker

Rosapha Walker, 1860, Linn. Soc. London, Proc. **4**: 100.—Kertész, 1909, Mus. Nat. Hungarici, Ann. **7**: 376.—Brunetti, 1923, Indian Mus., Rec. **25**: 70.

15. Rosapha bicolor (Bigot).

Calcochaetis bicolor Bigot, 1879, Soc. Ent. France, Ann. V, **9**: 189.

Rosapha bicolor philippinensis Brunetti, 1923, Indian Mus., Rec. **25**: 72.

The following characters, used by Brunetti in his key, will, in combination, serve to distinguish this species from the other known species of *Rosapha:* Thorax orange yellow, except pectus and a wedge-shaped mark at the anterior margin of the mesonotum, which are black; scutellum concolorous with the mesonotum; first two tarsomeres of hind tarsus white, the remainder of hind tarsus black; all femora yellow to the apex; wing hyaline, with two intense dark brown to blackish spots, one including the stigma and extending in diluted form onto the tip of the first basal and the base of the first posterior cell, the other at the wing apex.

DISTRIBUTION: India (Darjiling); Philippine Is.; S. Mariana Is.

S. MARIANA IS. GUAM: Male, Umatac, Mar., 1958, Krauss.

Brunetti thought he recognized a distinct "variety," or possibly even species on the basis of a more elongated thorax, a difference in coloration, and more extensive and intensive clouding of the dark wing areas. Both his type and that of Bigot are from Luzon, Philippine Islands. Brunetti apparently overlooked the fact that the type of *R. bicolor,* as pointed out by Kertész, was preserved in alcohol prior to being pinned and had lost its original color; this fact could well have accounted for the differences in coloration and thoracic proportions noted by Brunetti. All material that I have seen corresponds to the *philippinensis* description, and, unless it can be proven through further collecting and study that what Brunetti considered typical *bicolor* exists in nature, the synonymy is imperative.

Genus **Lophoteles** Loew

Lophoteles Loew, 1858, Berliner Ent. Zeitschr. **2**: 110.—James, 1948, U. S. Nat. Mus., Proc. **98**: 191 (species included in key), 212.

16. Lophoteles plumula Loew.

Lophoteles plumula Loew, 1858, Berliner Ent. Zeitschr. **2**: 111.

The following combination of characters, taken together, will serve to distinguish this from the other known species: antennae yellow, at most the flagellum darkened at apex dorsally; wings uniformly hyaline or subhyaline; all femora yellow.

DISTRIBUTION: Seychelles Is., New Guinea, New Britain, Solomon Is., New Hebrides, Mariana Is., Caroline Is., Marshall Is. (Radak Chain, type).

S. MARIANA IS. TINIAN: Female, Mt. Lasso, NW slope, Mar. 17, 1945, Dybas.

PALAU IS. PELELIU: Male, west coast, Feb. 2, 1948, Dybas.

YAP. YAP: Female, Mt. Madaade (Matade), 95 m., Dec. 1, 1952, Gressitt; female, male, Mt. Tabiwol (Gillifitz), 150 m., Nov. 29, 1952, Gressitt; two females, four males, Yaptown, 60 m., Nov. 23, 1952, Gressitt, and July 12-14, 1946, Townes; two females, two males, Giliman, June 10-12, 1957, Sabrosky; female, Gagil Dist., July-Aug., 1950, Goss; female, Ruul Dist., July-Aug., 1950, Goss; male, Kanif, July-Aug., 1950, Goss; male, female, no locality, Aug., 1952, Krauss.

TRUK. WENA (Moen): Two females, Mt. Tonaachau, Apr. 2, 1949, Potts. Ton (Tol): Female, four males, Mt. Unibot, Dec. 30, 1952, to Jan. 1, 1953, Gressitt; male, Sabote-Epin, Apr. 5, 1940, Yasumatsu and Yoshimura; male, July 31, 1946, Townes.

PONAPE. Colonia, five females, seven males: Nov., 1953, Beardsley; Mar. 15, 1948, Dybas; July 8, 1939, Esaki; under bark breadfruit, Feb. 23, 1948, Dybas; Agric. Expt. Sta., Jan. 6-20, 1953, Gressitt; and June-Sept. 1950, Adams. Male, Palikar (Paliker)-Colonia, Jan. 16, 1938, Esaki. Male, Nanipil, Feb. 25, 1948, sweeping, Dybas.

KUSAIE. Three females, eight males, Mutunlik, Jan. 23-27, 1953, at light, Gressitt, and Feb. 6 to Mar. 30, 1953, some at light, Clarke; male, Mt. Matante, 300 m., at light, Apr. 23, 1953, Clarke; female, male, Lele (Lelo), Dec. 2 and 28, 1937, Esaki.

CAROLINE ATOLLS. ULITHI: Two females, four males, Potangeras I., Nov. 10, 1947, Dybas, and Aug. 16, 1945, Baker. FAIS: Three males, Apr. 28, 1924, Beardsley, and Oct. 5, 1952, Krauss. IFALUK: Male, Ifaluk I., beating *Wedelia scaevola,* Sept. 9, 1953, M. Bates; female, Feb. 7, 1953, Beardsley. NOMWIN: Three males, Nomwin I., Feb. 17-18, 1954, Beardsley. PINGELAP: Male, Jan. 26, 1953, Gressitt. ULITHI: Male, Fassarai, July 10, 1946.

MARSHALL IS. RONGELAP: Female, four males, Dec. 18, 1954, J. J. Davis. WOTHO: Male, Wotho I., Oct. 20, 1953, Beardsley. KWAJALEIN: Three males, Bascom I., Aug. 10, 1944, Wallace. NAMU: Two males, Namu I., Oct. 24, 1953, Beardsley. AILINGLAPALAP: Female, four males, Bikajela (Bigatyelang) I., Dec. 11-26, 1948, Langford; female, Ailinglapalap I., Oct. 26, 1953, Beardsley. JALUIT: Two females, male, Imej (Emid) I., Sept. 26, 1953, Beardsley; three males, Imroj (Imrodj), Aug. 24, 1946, Townes; two males, Majurirok (Elizabeth) I., Sept. 25, 1953, Beardsley. KILI: Female, Oct. 2, 1953, Beardsley. NAMORIK: Two females, two males, Namorik I., Sept. 29, 1953, Beardsley. MAJURO: Three females, three males, Aug. 28, 1946, Townes. ARNO: Three males, Ine I., June 21, 1950, *Polypodium,* and Aug. 5, 1950, La Rivers.

Genus **Paracechorismenus** Kertész

Paracechorismenus Kertész, 1916, Mus. Nat. Hungarici, Ann. **14**: 163.

17. Paracechorismenus guamae James (fig. 5, *a*).
Paracechorismenus guamae James, 1950, Pacific Sci. **4**: 185.

DISTRIBUTION: S. Mariana Is.

S. MARIANA IS. SAIPAN: Three females, near Garapan, May 7, 1945, Dybas; two males, Mt. Mahansa (Matansha), Apr. 26, 1946, Krauss; Matansa (Matansha)-Kalabera (Calabera), May 8, 1940, Yasumatsu and Yoshimura. TINIAN: Female, eight males, Mt. Lasso, northwest slope, Mar. 17,

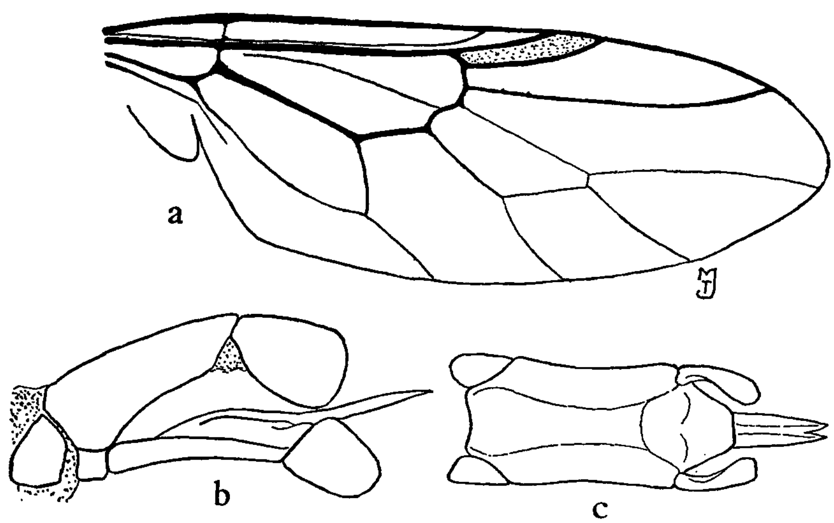


FIGURE 5.—a, *Paracechorismenus guamae,* wing. b, c, *Wallacea albiseta borealis:* *b,* male genitalia, lateral view, setae and hairs omitted; *c,* same, ventral view.

1945, Dybas. AGIGUAN: Two females, May 28, 1952, Peterson. GUAM: Five females, male, Pt. Oca, May 28 and June 2, 1945, Dybas, July 16, 1945, Bohart and Gressitt, and light trap, June 6, 1945, Bohart and Gressitt; male, Mt. Lamlam, Feb., 1958, Krauss; male, Yigo, Feb., 1958, Krauss.

The final generic disposition of this species and, indeed, the final status of the genus *Paracechorismenus,* will have to depend on a thorough, much needed revision of the small, black Pachygasterinae of the world. In Kertész' key, this species traces well to *Paracechorismenus* and Kertész' figures and extensive description fit except for characters that might be of specific importance. *Para-*

cechorismenus is probably a valid genus which contains this species as well as the three which Kertész referred there, *albipes* (Brunetti), *infurcatus* (de Meijere) and *intermedius* Kertész. The strong downward bowing of the base of vein R_{4+5} anterior to the crossvein r-m is characteristic of at least *P. albipes* and *P. guamae*. The front of *P. guamae* female is narrower than in the other species of this genus, being only about one-fourth the head width; *P. guamae* may further be distinguished from the known species by the combination of the darkening of the flagellum dorsally, the long arista (about 1.65 as long as the rest of the antenna), and the uniformly yellow (except at apices of the tarsi) legs.

Genus **Wallacea** Doleschall

Wallacea Doleschall, 1858, Nat. Tijd. Ned. Ind. **17**: 82.

This genus, together with the Ethiopian *Argyrobrithes* Grünberg, *Sternobrithes* Loew, and the possibly distinct *Gobertina* Bigot, forms a closely related complex of rather small, black, sometimes strongly silvery-tomentose pachygasterine flies, with a high-set antenna, a similar wing venation, and a distinctly bordered, denticulate or corniculate, conical scutellum. *Wallacea* differs from its African relatives in having the scutellum corniculate and an antenna that terminates in an arista, rather than a flattened style.

The scutellar structure differentiates *Wallacea* from the other genera of Micronesian Pachygasterinae. The rim of the scutellum is distinctly, though very narrowly, flattened. On its margin this rim bears a number of cornicles which should be differentiated from the minute, regular denticles that occur on the scutellar margin in the genera *Lophoteles, Aidomyia,* and *Camptopteromyia.* These denticles are minute, visible for certainty only at magnifications of 60x or higher, are regular in size and more or less in arrangement, and are spheroid (*Lophoteles, Aidomyia*) or elongated-cylindrical (*Camptopteromyia*). In *Wallacea* the cornicles are more hornlike in shape and are irregular in size and distribution; they are much larger, at least in part, than the above-mentioned denticles, those at the apex of the scutellum, in such species as *W. argentea,* taking almost the form of two (or three) apical spines. Large cornicles may be set next to denticlelike ones along the scutellar margin. Some cornicles (in *W. argentea,* for example) may be compound, with a seta-bearing branch extending laterad of the main cornicle.

Key to Micronesian species of Wallacea

1. Eyes white-haired; front of male broad; flagellum of antenna elongated oval; arista white and white-haired in both sexes; antenna inserted about two-thirds way from lower angle of eye to vertex; second and third abdominal terga of male densely silvery tomentose, obscuring ground color............**18. argentea**

Eyes bare; front of male greatly constricted medially, at narrowest less than width of an ocellus; flagellum of antenna conical, especially in male; arista white and white-haired only in female, blackish in male; antenna inserted about three-fifths from lower corner of eye to vertex; abdomen of both sexes with only moderately dense pile and tomentum, not conspicuously silvery....**19. albiseta borealis**

18. Wallacea argentea Doleschall.

Wallacea argentea Doleschall, 1858, Nat. Tijd. Ned. Ind. **17**: 82.

DISTRIBUTION: Amboina, Solomon Is., New Guinea, New Hebrides, Queensland, Philippine Is., Palau Is.

PALAU IS. Koror: Male, Apr., 1954, Beardsley; female, ex *Ipomoea,* Sept. 7, 1953, Beardsley.

19. Wallacea albiseta borealis James, new subspecies (fig. 5, *b, c*).

Differs from typical *albiseta* in that male lacks erect pile and in that mesonotal tomentum of female is usually pale yellow to golden, contrasting with white tomentum of pleura (sometimes also in male). As in typical *albiseta,* eyes bare, in male almost contiguous briefly above frontal triangle; antennae yellow, becoming brown to black on apical part of flagellum; basal annulus of arista shining black, terminal piece blackish at base, but mostly whitish in female, yellowish to blackish in male, and distinctly thicker in female than in male. Femora black, tibiae except for broad bases and apices black.

Genitalia as in typical *albiseta;* genital capsule of male long and heavily sclerotized; aedeagus bifid; forceps and cerci oval, each a little broader than long.

Holotype, male (US 66291), Ototo Jima, Kammuri-iwa (S.W. Bay), Chichi Jima, Bonin Islands, June 3, 1958, Snyder. Allotype, female, Bonin Is.: Chichi Jima, Omura, "Camp Beach," May 5 to June 9, 1958, Snyder. Paratypes, 31 males, 19 females, with distribution as follows:

Bonin Is. Chichi Jima: Three males, Sakaiura, "Bull Beach," May 12-31, 1958, Snyder; 11 males, five females, Omura, same data as allotype; female, 3 males, Yoake Yama, Apr. 21, 1958, Snyder; male, female, Miyanohama, "Jack Wm's Beach," May 12 to June 9, 1958, Snyder; female, Tsurihama, June 23, 1949, Mead; two females, Okumura, "Yankee Town," May 12 to June 9, 1958, Snyder; female, Yatsuse R., Minato ko, "Gen.'s Beach," Apr. 10-22, 1958, Snyder. Ototo Jima: Eight males, four females, same data as holotype. Ani Jima: Four males, Sen-zan (N.E. Bay), May 28, 1958, Snyder. Haha Jima: Three females, Okimura, Apr. 26 to May 9, 1958, Snyder.

N. Mariana Is.: Pagan: Male, Regusa-Tarage (Tarague), Apr. 28, 1940, Yasumatsu and Yoshimura.

DISTRIBUTION: Bonin Is., N. Mariana Is.

The black front tibia places this subspecies in *W. tibialis* Kertész, according to Brunetti's key (1923, Indian Mus., Rec. **25**: 61), but some specimens of typical *albiseta* also go there. *W. tibialis* is readily separable from *albiseta* on the basis of its pilose eyes.

Genus **Aidomyia** Kertész

Aidomyia Kertész, 1916, Mus. Nat. Hungarici, Ann. **14**: 192.

The *Pachygaster*-like Pachygasterinae are in need of a thorough generic review; consequently, generic references must in most cases be made on a tentative basis. *Aidomyia* was erected for the reception of a single species, *A. femoralis* Kertész, from Taiwan (Formosa). The species here described does not agree with all characters given in Kertész' rather extensive description of the genus, but it traces there without difficulty in his key to the genera of Pachygasterinae (op. cit., 127-140) and it seems to fit *Aidomyia* better than any other existing genus.

20. **Aidomyia snyderi** James, n. sp. (fig. 6).

Male. Measurements of head in micrometer units (60 = 1 mm): length, 46; height, 66; width, 90. Eyes bare, subcontiguous, separated at narrowest by a distance less than half diameter of median ocellus; facets on lower part smaller than on upper but not separated by a sharp division. Occipital orbits evanescent except on lower third, where they are prominent, although not as much so as in female. Face from anterior view deeply concave along oral margin, concavity reaching almost to antennae. Head black, ocellar triangle and narrow frontal stripe shining; frontal triangle, except a very narrow median line which continues frontal stripe to bases of antennae, and face densely silvery tomentose; occiput with scattered whitish pile which becomes silvery tomentum along inner margins of orbits below. Proboscis brown. Antenna short; first and second segments broader than long, second bowed convexly into flagellum, most noticeably so from inner aspect; flagellum kidney-shaped, with three annuli evident under high magnification and with a two-annulated micropubescent arista, basal annulus of which is short and truncate-conical, arista proper longer than the rest of antenna combined; antenna yellow, basal two annuli of flagellum brownish inwardly, arista becoming whitish a short distance from its base.

Thorax black; mesonotum with dense silvery tomentum (in some specimens yellowish before scutellum) appearing particularly dense and silvery on postsutural area when viewed from behind. Scutellum triangular, apex broadly rounded, with a rather poorly defined margin; scutellum about two-fifths as long as mesonotum and a little broader at base than long; margin microdenticulate. Pleura with scattered, appressed whitish hairs and in addition with whitish pollen on metapleura; a broad, bare polished area on mesopleuron where anterior femur opposes it and another taking in pteropleuron, hypopleuron, and upper part of sternopleuron excluding that portion immediately adjacent to pteropleuron. Wing hyaline, stronger veins brownish yellow to yellow basad of discal cell, yellow beyond it; vein R_{2+3} feeble, separating from R_{4+5} a little beyond crossvein r-m; r-m very short, sometimes almost punctate. Wing uniformly clothed with microtrichia, except only at extreme base. Halter white, stalk little if any darker than knob. Legs pale yellow, almost white, a little darkened on base of middle and hind coxae, somewhat more brightly yellowish on apical tarsomeres.

Abdomen black with scattered whitish appressed hairs which become brownish to blackish on discs of second and third terga. Genitalia yellow, rather delicate, small; aedeagus whitish, relatively large, trifid, guards diverging from intromittent organ, all three cylindrical and of equal texture, rounded apically; cerci narrow. Length, 3 to 4.5 mm.

Female. Head as in male, but eyes separated; front narrowing from vertex to upper part of silvery-tomentose area, where it forms a poorly defined callus, then broadens to oral margin; front, ocellar triangle, and vertex with short, black, erect pile; front glabrous and bare narrowly along mid-frontal suture, callus, and narrow ocular orbits above callus; mid-frontal suture deeply impressed from callus to antennal bases. Measurements in micrometer units: head length, 39; head height, 55; head width, 70; width of vertex, 17,

of front at narrowest (across callus), 12, of face at oral margin, 31. Mesonotum and scutellum wholly yellow tomentose. Genital segments slender, delicate. Otherwise, except sexually, as described for male.

Holotype, male (US 66292), Sakai-ura, "Bull Beach," Chichi Jima, Bonin Islands, May 12-31, 1958, Snyder. Allotype, female, same data as holotype except Apr. 5-25. Paratypes, 46 males, 35 females, with distribution as follows:

Bonin Is. Chichi Jima: Two males, female, July 10, 1951, R. Bohart; two males, female, Sakai-ura, same data as holotype; five males, female, same data as allotype; 16 males, 10 females, Omura, "Camp Beach," Apr. 2-25 and May 5 to June 9, Snyder; three males, four females, Okumura, "Yankee Town," May 12 to June 9, 1958, Snyder; two males, four females, Miyanohama, "Jack

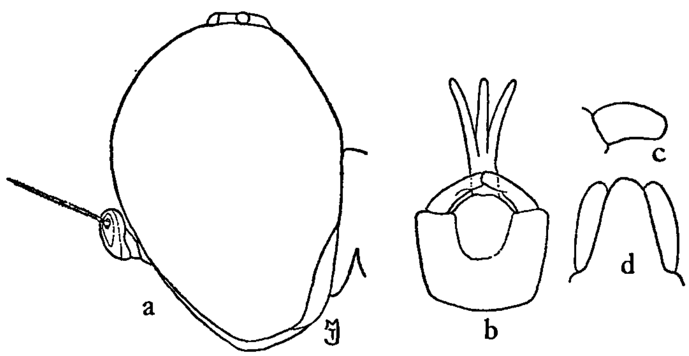


FIGURE 6.—*Aidomyia snyderi:* **a**, male, outline of head, lateral view; **b**, male genitalia with extended aedeagus, ventral view; **c**, male forceps, viewed apically; **d**, terminal abdominal tergum and cerci, dorsal view, setae and hairs omitted.

Wm.'s Beach," Apr. 19-21 and May 12 to June 9, 1958, Snyder. Ototo Jima: Four males, two females, Kammuri-iwa (S.W. Bay), June 3, 1958, Snyder. Haha Jima: Nine males, 10 females, Okimura, Apr. 26 to May 9, 1958, Snyder; three males, two females, no locality, June 29 to July 2, 1949, Mead.

DISTRIBUTION: Bonin Is.

The male of the type species of *Aidomyia, A. femoralis,* is unknown. The female is smaller than that of *A. snyderi* (2.5 to 2.9 mm), has black femora, a more elongated first antennal segment, and a parallel-sided, wider front (two-sevenths the head width). According to Kertész' statement, the ratio of head width, height, and length is different (35:32:17), although the height-length ratio as measured from his illustration is 28:17 instead of 32:17, very close to that of *A. snyderi.*

Genus **Camptopteromyia** de Meijere

Camptopteromyia de Meijere, 1914, Tijdschr. Ent. **56,** suppl.: 12.

This genus was erected for the reception of a new species, *Camptopteromyia fractipennis* De Meijere, from Java. It is peculiar in that the costa and radial sector are considerably weakened or broken just basad of the discal cell; consequently, in pinned specimens, the wing often becomes folded back upon itself beyond that point. Otherwise, members of this genus are ordinary-appearing, small, *Pachygaster*-like flies; the antennae are inserted low upon the head, much closer to the oral margin than to the ocellar triangle; the scutellum is definitely margined, broad and broadly rounded, with a row of short but distinct, rather tubular, finger-like denticles along its margin. In the Micronesian species, at least, the eyes of the male are contiguous or nearly so and the facets are distinctly larger above than below, although there is no clear line of demarcation; the eyes of the female are broadly separated, the front being almost parallel-sided, though broader at the anterior ocellus than at its narrowest point some distance above the base of the antennae. The wing venation is similar throughout the genus and, at least in the Micronesian species, the wings are uniformly clothed with microtrichia except at the extreme base. The male genitalia are small and simple in construction; the forceps are oval; the aedeagus is trifid, the intromittent organ and guards all being tubular.

The Micronesian forms seem to constitute four distinct species, none of them identical with *fractipennis*. It is difficult to explain the presence of three species on one small island (Ulebsehel), but especially in view of the distinctness of *C. lanata* from the other forms, there is no justification, on the basis of present information, for considering them either variants or hybrids. I suggest the hypothesis that *Camptopteromyia* is undergoing rapid speciation within its geographically restricted but much interrupted range; that because of the small size and perhaps obscure habitat these flies have gone unnoticed in a relatively poorly collected area; and that separate introductions of what most probably are scavengers have been brought about during war-time or early post-war activities in these islands.

Key to the known species of Camptopteromyia

1. Flagellum of antenna black; legs black, only hind tarsus, except its last tarsomere, white .... **fractipennis** de Meijere
   Antenna wholly yellow or white; at least femora wholly yellow or at most brownish 2

2(1). Legs, except parts of middle and hind coxae, wholly yellow 3
   At least entire fore tibia and tarsus black, or else all tibiae black or blackish on their apical halves 4

3(2). Mesonotum and scutellum clothed with soft, reddish-yellow to reddish-brown tomentum .... **21. flavipes**

Mesonotum without tomentum, or nearly so, but instead with short, semi-appressed black pile.. **22. obscura**

4(3). Front tibia wholly black, others yellowish brown or discolored brown; mesonotum and scutellum, as viewed laterally, almost in a line with each other, groove separating them feeble; mesonotum and scutellum with reddish-yellow to reddish-brown tomentum, as in *flavipes*.. **23. tibialis**

All tibiae black to blackish brown on apical half, yellowish to whitish, in contrast, on basal half; mesonotum and scutellum, as viewed laterally, both strongly convex, groove separating them deep and prominent; mesonotum and scutellum with long, appressed, silky, tomentum-like pile that conceals background.. **24. lanata**

21. **Camptopteromyia flavipes** James, n. sp. (fig. 7, *a, c*).

Male. Eyes broadly contiguous for half distance from antenna to anterior ocellus. Ocellar triangle prominent; ocelli moderately large. Head measurements in micrometer units (60 = 1 mm): head height, 37; head width, 54; head length, 37; from anterior ocellus to antenna, 29; height of frontal triangle, 8; apex of frontal triangle to anterior ocellus, 21; from antenna to upper corner of oral margin, 5. Head black; ocellar triangle subshining; face and facial triangle, except a very narrow median stripe, with dense silvery tomentum which obscures ground color; cheeks and occiput subshining, with scattered white pile; occipital orbits feebly and narrowly developed below. Antenna pale yellow; arista yellow, becoming whitish beyond its base, whitish micropubescent; pile of first two antennal segments white; length of three antennal segments and of arista respectively 2, 2, 6, 21. Proboscis yellowish.

Profile of mesonotum and scutellum as in figure 7, *c*, mesonotum and scutellum almost in a straight line and separated by a feeble groove; margin of scutellum about 0.3 length

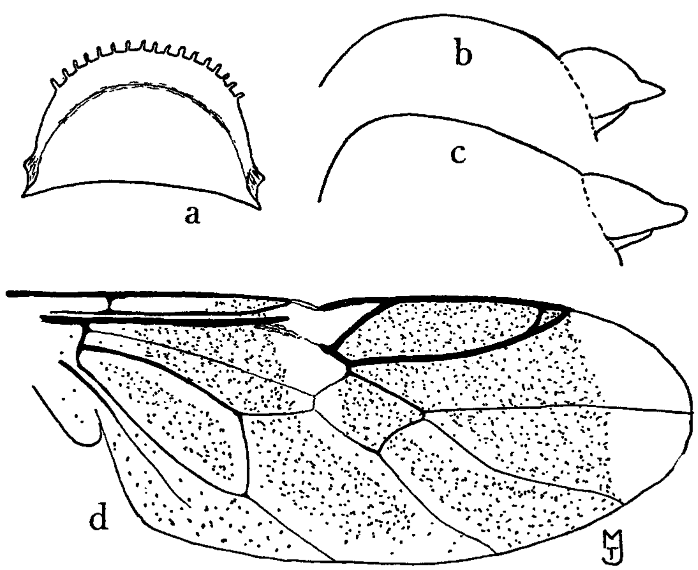


FIGURE 7.—**a, c,** *Camptopteromyia flavipes: a,* outline of scutellum; *c,* profile of mesonotum and scutellum, lateral view. **b, d,** *C. lanata: b,* profile of mesonotum and scutellum, lateral view; *d,* wing.

of scutellum; scutellum with about 16 denticles on its margin, which are restricted to approximately apical half of scutellum. Thorax black; mesonotum and scutellum with conspicuous reddish-yellow to reddish-brown tomentum which, however, does not conceal ground color. Pleura largely shining, however largely covered with whitish pile except on posterior part of mesopleuron, pteropleuron, and much of upper part of sternopleuron, which are bare. Halter white, knob brownish on its anterior surface. Middle and hind coxae largely brownish yellow; legs otherwise wholly yellow and yellow-haired. Wing veins brownish along anterior part of wing, otherwise whitish; stigma pale brownish, area at wing fracture yellowish; wing very dilute brownish except at apex and along posterior margin.

Abdomen black, tending to reddish brown on fifth segment and sometimes venter and apex of the fourth tergum; dorsally with golden-yellow tomentum laterally and apically, and with blackish tomentum medially, ventrally with scattered white appressed pile. Genitalia yellow, yellow-haired. Length, 2-2.5 mm.

Female. Front narrowing somewhat from anterior ocellus to its narrowest point above antennae, respective measurements being 11 and 8 micrometer units; front dull, with rather abundant short yellow tomentum-like pile. Antennal flagellum more robust than in male and distinctly kidney-shaped; arista proportionately shorter, measurement 18 in comparison with 12 for remainder of antenna. Occipital orbits very narrow, hardly noticeable. Otherwise, except sexually, as described for male.

Holotype, male (US 66293), Kolonia (Yaptown), Yap, July 12, 1946, Townes. Allotype, female, same data. Paratypes, male, same data; male, same data but July 13; two males, Mt. Madaade (Matade), July 12, 1946, Townes; male, N. Yap I., July-Aug., 1950, Goss; female, Weloy, Dugor, over rotting breadfruit, June 15, 1957, Sabrosky.

DISTRIBUTION: W. Caroline Is. (Yap).

22. **Camptopteromyia obscura** James, n. sp.

Differs from the description of *C. flavipes* in following respects.

Male. Eyes subcontiguous, separated distinctly but very narrowly by a shining black stripe, not more than half as wide as diameter of anterior ocellus. Head measurements in micrometer units (60 = 1 mm): head height, 36; head width, 43; head length, 26; antenna minus arista, 8; arista, 16. Mesonotum and scutellum without tomentum but with uniform short, black, semi-appressed to appressed pile, integument shining; pleura with black hairs except on ventral regions (pectus). Halteres infuscated. Wing pale brown except at apex and posteriorly. Abdomen with scattered yellowish pile dorsally and ventrally. Length, 2 mm.

Female. Unknown.

Holotype, male (US 66294), Ulebsehel (Auluptagel), Palau Is., Jan. 10, 1953, Beardsley. Paratype, male, Ulebsehel (Aurapushekaru), beating vegetation, Jan. 13, 1948, Dybas.

DISTRIBUTION: W. Caroline Is. (Palau).

23. **Camptopteromyia tibialis** James, n. sp.

Differs from the description of *C. flavipes* in following respects:

Male. Eyes subcontiguous, separated distinctly but very narrowly by a shining black stripe, not more than half as wide as diameter of anterior ocellus. Head measurements in micrometer units (60 = 1 mm): head height, 35; head width, 48; head length, 29; antenna minus arista, 9; arista, 23. Arista wholly white. Mesonotum and scutellum clothed with short, appressed, yellow tomentum which is finer, more hair-like, and much less noticeable than in *flavipes,* although approximately as dense. Front tibia and tarsus black; hind femur

and middle and hind tibiae brownish, discolored. Halter brownish. Wing distinctly brownish except at apex. Abdomen wholly black, with scattered whitish hair. Genitalia missing in type.

Female. Head width, 44; width of front at anterior ocellus, 9, at narrowest, 7. Front shining black, almost bare above constriction, with only a few fine, whitish hairs. Halter whitish; wings not as intensely darkened as in male. Otherwise, except sexually, as described for male.

Holotype, male (US 66295), Ulebsehel (Auluptagel), Palau Is., sweeping native vegetation, Feb. 7, 1952, Beardsley. Allotype, female, same data.

DISTRIBUTION: Palau Is.

24. **Camptopteromyia lanata** James, n. sp. (fig. 7, *b, d*).

Male. Eyes subcontiguous, but separated narrowly above frontal triangle by an area which gradually widens, becoming a little more than width of anterior ocellus at level of that ocellus; a few silky white hairs, visible from anterior view, just below anterior ocellus. Measurements in micrometer units (60 = 1 mm): head height, 35; head width, 52; head length, 26; antenna to anterior ocellus, 21; height of frontal triangle, 9; apex of frontal triangle to anterior ocellus, 12. Ocelli larger than in other Micronesian species. Head black, silvery tomentose as in *flavipes;* tomentum of head and pile of antenna longer, however; first and second antennal segments and arista white, third segment pale yellow. Proboscis yellow to brownish yellow.

Mesonotum more convex than in other Micronesian species, scutellum likewise convex and forming, from lateral view, a distinct groove at its union with the mesonotum (fig. 7, *b*); margin of scutellum about 0.25 length of scutellum and terminating in about 16 fingerlike denticles, with inwardly curved tips, located not only along its apex but also on sides almost to base. Thorax black. Mesonotum and scutellum with long, silky, appressed tomentum-like pile, which is silvery on anterior part of mesonotum and on scutellum but becomes yellowish behind mesonotal suture and on some of slopes before it; similar silvery pile covering the pleura except pteropleuron, hypopleuron, and that part of sternopleuron just above middle coxa. Halter white. Coxae, apical half or more of each tibia, front tarsus, and last tarsomere of middle and hind tarsi, brownish black; legs otherwise whitish yellow. Wing distinctly clouded with brown, except at apex, area of wing fracture, at extreme base, and along some of wing veins (fig. 7, *d*); clouding very evident, but grading into subhyaline areas so that exact pattern becomes somewhat indistinct. Abdomen black, clothed dorsally and ventrally with silky, silvery, appressed pile. Length, 2 mm.

Female. Unknown.

Holotype, male (US 66296), Ulebsehel (Auluptagel), Palau Is., Sept., 1952, Krauss. Paratype (BISHOP), male, same data but Feb. 7, 1957, Beardsley.

DISTRIBUTION: Palau Is.

CALLIPHORIDAE

INTRODUCTION

Despite the medical importance of the Calliphoridae, very little is known of the occurrence and distribution of these flies in Micronesia. Records for the family include those of *Chrysomya megacephala* (Fabricius) from Guam (Harris and Down, 1946), from Wake Island (Bryan, 1948, a), and from Guam and Saipan (James, 1948, U. S. Dept. Agric., Misc. Pub. **631**: 74); of *C. rufifacies* (Macquart) from Guam (Swezey, 1946, d) and from Saipan (James, loc. cit., 71); and of *Phaenicia sericata* (Meigen) from Wake I. (James, loc. cit., 87). Bohart and Gressitt (1951) listed six species for Guam: *C. megacephala, C. rufifacies, C.* near *nigripes* Aubertin, *Phaenicia cuprina* (Wiedemann), *Rhinia testacea* Robineau-Desvoidy, and *Stomorhina quadrinotata* Bigot. The present report corrects some synonymy and adds five species, one of them new to science.

No attempt is made to make this or subsequent synonymies complete; in fact, important references are sometimes intentionally omitted. Only those references are included which will suffice to indicate the synonyms and essential combinations and to give authority for statements made in the discussion.

Zoogeography

Unlike Hawaii, Micronesia has but a scant endemic blowfly fauna. The reason can probably be found in the scarcity of suitable breeding media in an area of small land masses separated by great distances and associated, until recent times, with a lack or scarcity of large animal carcasses. The accident of geographic separation has apparently hindered the evolution of forms which are adaptable to the native breeding media of the islands. Obviously, the nonendemic fauna has resulted partly from the importation by man of adaptable forms that can subsist on the islands and partly from the change in the economy of the islands, including introduction of larger mammals and the development of garbage dumps, which has permitted development and survival of those forms which require larger amounts of carrion and animal wastes for breeding purposes.

Aside from the one known endemic species, the calliphorids of Micronesia fall into two groups, so far as geographic origin is concerned. First, three species are invading the area from the north, though apparently not very successfully; two of these, *Hemipyrellia ligurriens* (Wiedemann) and *Stomorhina obsoleta* (Wiedemann), are recorded only from the Bonin Islands, whereas *Phaenicia sericata* (Meigen), the common greenbottle fly of the Holarctic region, is known in this area only from the Bonin, Volcano, Wake, and Marshall Islands. The second group, the true Micronesia invaders, consists of seven

Distribution of Micronesian Calliphoridae

	Micronesian Island Groups												Other Localities
					Caroline								
	Bonin	Volcano	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	
Calliphorinae													
1. Hemipyrellia ligurriens	×												E. Asia to Australia
2. Hemipyrellia tagaliana				×	×	×	×	×	×	×	×		Philippines, East Indies
3. Lucilia snyderi*	HJ†												
4. Phaenicia cuprina	×			×	×			×			×	×	Widespread, tropical and warmer temperate
5. Phaenicia sericata	×	×									×		Wake I., Holarctic; widely introduced elsewhere
Chrysomyinae													
6. Chrysomya megacephala	×	×	×	×	×	×	×	×	×	×	×	×	Wake I.; E. Asia to Australia
7. Chrysomya rufifacies			×	×	×	×		×	×	×	×		Oriental and Australian regions
8. Chrysomya nigripes				G†									Ceylon, S.E. Asia
Rhiniinae													
9. Rhinia apicalis				×	×		×	×			×	×	Africa, Asia Minor, Oriental region, S. Pacific
10. Stomorhina discolor				×	×	×		×				×	Widespread, Oriental and Australian regions
11. Stomorhina obsoleta	×												China, Japan

* Described as new.
† HJ = Haha Jima only; G = Guam only.

species that have come from the south and west. With the exception of *Chrysomya nigripes* Aubertin, these flies are much more successful and have a wide distribution; one of them, *Chrysomya megacephala,* is very abundant throughout the area.

An additional species, *Lucilia graphita* Shannon, is included in the key but not in the discussion. This native of the leeward Hawaiian Islands has been intercepted from aircraft several times on Guam; however, there is no indication that it has as yet become established on any of the islands of Micronesia.

Most of the Calliphoridae of Micronesia are probably relatively harmless scavengers. However, *Chrysomya megacephala* was considered by Harris and Down (1946) to be of considerable importance in the spread of amoebiasis, hookworm, and other intestinal infections; Bohart and Gressitt (1951) consider this species "unquestionably the greatest menace of any of the flies on Guam with regard to the spread of fecal pathogens." James (1948, loc. cit., p. 74) has summarized its role in relation to human myiasis. The closely related obligatory parasite, *C. bezziana* Villeneuve, apparently has not yet invaded Micronesia.

SYSTEMATICS

Key to Micronesian Subfamilies, Genera, and Species of Adult Calliphoridae

1. Stem vein bare on upper side of basal section (Calliphorinae); lower squama bare above; ridge between lower squama and postalar callus with stiff, bristly hairs 2
   Stem vein setulose on upper posterior side of basal section; lower squama bare or pilose; ridge between lower squama and postalar callus bare, although slopes between this ridge and callus may be clothed with bristly hairs 7

2(1). Convexity above hind spiracle with fine erect hairs much longer than the usual pilosity; subcostal sclerite with stiff, erect setulae........ 3
   Convexity above hind spiracle with only short, soft pubescence........ 4

3(2). Color usually greenish; eyes of male separated by at least width of antennal segment 3, the frontale usually distinct throughout its length; male genitalia with inner forceps (mesolobe) broadly diverging for a considerable distance, outer forceps (paralobe) long, slender, and pointed, and lateral lobes elongated and testaceous; first visible sternite and sides of tergites in male with only sparse, short bristly hairs........**1. Hemipyrellia ligurriens**
   Color usually bright blue or bluish green; eyes of male separated by less than width of ocellar triangle, frontale evanescent medially and parafrontals very narrow; male genitalia with inner forceps not diverging, outer forceps blunt and testaceous apically, and lateral lobes black, compact and oval; first visible sternite and sides of tergites in male with dense, coarse, long bristles........**2. Hemipyrellia tagaliana**

4(2). Subcostal sclerite with stiff, erect setulae; body almost entirely subshining black 5
   Subcostal sclerite with soft pubescence only, without stiff setulae; body largely metallic green to coppery........ 6

5(4). Two postsutural acrostichals........**3. Lucilia snyderi**
   Three postsutural acrostichals........**Lucilia graphita**

6(4). Central occipital area (cerebrale) with a single seta on each side, just behind inner vertical bristle; abdomen usually strongly coppery; male commonly with two pairs of ocellar bristles, with front at narrowest 0.18 head width, and with arms of sternite 5 as long as tergite 4........**4. Phaenicia cuprina**
   Central occipital area usually with a group of about five setae (sometimes reduced to two or even one) on each side, just behind inner vertical bristle; abdomen varying from bright green to coppery; male commonly with one pair of ocellar bristles, with front at narrowest 0.11 head width, and with arms of sternite 5 much shorter than tergite 4..**5. Phaenicia sericata**

7(1). Greater ampulla (rounded protuberance below base of wing) distinctly hairy; lower squama truncated at apex and concave on outer margin, at least in part haired above; epistoma only moderately protuberant (Chrysomyinae) 8

Greater ampulla only pubescent; lower squama always bare on upper surface, rounded at apex and straight or convex on outer margin; epistoma, in Micronesian species, strongly protuberant (Rhiniinae) 10

8(7). Anterior (mesothoracic) spiracle brown; lower squama brown; antennae and cheeks testaceous to reddish brown, gray pruinosity of cheeks not obscuring ground color; frons of female broad, at least 0.35 head width, sides slightly convex on upper half; eyes of male almost contiguous .... **6. Chrysomya megacephala**

Anterior spiracle white; squamae white; antennae mostly dark brown to black; cheeks black or nearly black ventrally and silvery pruinose dorsally from certain angles; frons of female parallel-sided 9

9(8). Front narrow, in female not more than 0.30 head width, in male eyes separated by no more than width of ocellar triangle; cheek grooves and basal antennal segments yellowish to reddish; upper front and vertex at most subshining black, not metallic, and only short-haired; frontal bristles not differentiated in male .... **7. Chrysomya rufifacies**

Front broad, in female at least 0.35 head width, in male eyes separated by length of antennal segment 3; cheek grooves and basal antennal segments black; upper front and vertex partly metallic green and with bushy, long hair in both sexes; frontal bristles differentiated in both sexes .... **8. Chrysomya nigripes**

10(7). Apical cell closed and petiolate; abdomen orange, setulae, however, arising from dark spots; sternopleura largely shining black .... **9. Rhinia apicalis**

Apical cell open or at most closed in margin; abdomen usually black with yellowish spots on basal segment, sometimes quite extensively yellowish to yellowish white; sternopleura largely or wholly pollinose 11

11(10). A large polished black spot behind front coxa, on anterior part of sternopleuron and adjacent mesopleuron; yellow of dorsal aspects of abdominal terga variable but usually including all of segment 1 except hind margin, two large, narrowly separated spots on segment 2, and sometimes a similar though smaller pair on segment 3 .... **10. Stomorhina discolor**

Pleura wholly pollinose except for small polished black spots at bases of individual setulae; abdomen black, with dorsal, pale color limited to small paired yellowish spots on tergite 2 and sometimes on 1 .... **11. Stomorhina obsoleta**

Key to known mature larvae of Micronesian Calliphoridae

1. Posterior spiracles placed in a transverse depression which opens laterally; peritreme not surrounding "button" 2

Posterior spiracles not in a depression, flush with posterior surface; peritreme surrounding "button" 4

2(1). Each body segment, except 1, with a dorsal row of long, tapering tubercles, larva consequently having a very spinose appearance; body heavily sclerotized .... **7. Chrysomya rufifacies**

All but caudal segment lacking rows of long tubercles 3

3(2). Spiracular depression with six tubercles on its dorsal and six on or near its ventral margin .... **6. Chrysomya megacephala**

Spiracular depression with four tubercles on its dorsal and two on its ventral margin .... **8. Chrysomya nigripes**

4(1). Posterior spiracles separated by a distance equal to three times diameter of a spiracular plate; spiracular slits arranged in a cloverleaf pattern; tubercles above spiracular field elongated, each much longer than its basal diameter .... **9. Rhinia apicalis**

Posterior spiracles separated by a distance not much greater than diameter of each spiracle 5

5(4). Mouth hooks distinctly curved; ventral cornu of pharyngeal sclerite with posterior edge prolonged ventrally; posterior spiracular plate roughly oval in shape, peritreme wide and dark........ **4. Phaenicia cuprina**

Mouth hooks less curved; ventral cornu of pharyngeal sclerite with posterior edge relatively straight; posterior spiracular plate pear-shaped, peritreme narrow and not heavily sclerotized........ **5. Phaenicia sericata**

SUBFAMILY CALLIPHORINAE

Genus **Hemipyrellia** Townsend

Hemipyrellia Townsend, 1918, Ins. Inscit. Mens. **6**: 154.—Aubertin, 1931, Zool. Soc. London, Proc. **1931**: 497.—Senior-White, Aubertin, and Smart, 1940, Fauna Brit. India, Dipt. **6**: 41.—Zumpt, 1956, Exploration du Parc National Albert **87**: 63; Zumpt, 1956, IN Lindner, Die Fliegen Palaearkt. Reg. **64** (i): 56.

The genus falls into the tribe Luciliini as recognized by Hall (1948, Blowflies of North America, 211). Some authors have considered it a synonym of *Lucilia*. However, Malloch, in his later works; Aubertin, who reviewed the genus; Senior-White, Aubertin, and Smart; and Zumpt, as well as most contemporary workers, treat it as a separate genus, distinguishable from *Lucilia* (including *Phaenicia*) by the long hairs on the convexity above the posterior spiracle. The general appearance is that of a *Lucilia*.

1. **Hemipyrellia ligurriens** (Wiedemann).

Musca ligurriens Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 655.
Musca solaia Walker, 1849, List Dipt. Ins. Brit. Mus. **4**: 887.
Musca fortunata Walker, 1860, Linn. Soc. London, Jour. Proc. **4**: 137.
Somomyia caeruleolimbata Bigot, 1887, Soc. Zool. France, Bull. **12**: 599.
?*Lucilia ballardii* Patton, 1922, Indian Jour. Med. Res., **9**: 573.
Lucilia albopilosa Senior-White, 1926, Indian Mus., Rec. **28**: 130.
?*Hemipyrellia orientalis* Townsend, 1927, Suppl. Ent. **16**: 56.
Hemipyrellia cyaneo-marginata (Macquart), Malloch, 1927, Linn. Soc. New South Wales, Proc. **52**: 320 (nec Macquart).
Hemipyrellia ligurriens (Wiedemann), Aubertin, 1931, Zool. Soc. London, Proc. **1931**: 504, synonymy.

DISTRIBUTION: Widely distributed from northern Australia through the East Indies and southeastern Asia into China and Japan, Bonin Is. It apparently has entered Micronesia from the north.

BONIN IS. ANI JIMA: 17, April to June 1958, Snyder. CHICHI JIMA: 91, July 1951, R. M. Bohart, and April to June, 1958, Snyder. HAHA JIMA: 121, July 1951, R. M. Bohart, and April to May 1958, Snyder.

Though *ligurriens* is the name that has been used for this species in virtually all the literature, Patton (1925, Philippine Jour. Sci. **27**: 185) examined what he thought was the type, in the Trentepohl collection, and declared it to be "the Oriental race of *Chrysomyia albiceps* var. *putoria*." However, according to Miss Aubertin's statement, the Vienna specimen, labeled "type," from the Wiedemann and Trentepohl collection, is what has been taken for *ligurriens,* and, according to Curtis Sabrosky (*in litt.*) the specimen labeled "M. liguriens [sic!], Macao, Trentepohl" in the Copenhagen Museum, where Patton said he examined the type, is undoubtedly a *Hemipyrellia.* If Patton is right, the series is a mixed one, and in the absence of a holotype designation and for the sake of stability of nomenclature, the name *ligurriens* should be preserved.

2. **Hemipyrellia tagaliana** (Bigot). (Figure 8, *a, b.*)

Somomyia tagaliana Bigot, 1877, Ent. Soc. France, Ann. V, **7**: 44.

Hemipyrellia tagaliana (Bigot), Aubertin, 1931, Zool. Soc. London, Proc. **1931**: 505.

Males easily distinguished from that of *H. ligurriens* on basis of characters given in key, but females distinguished only with difficulty as color, according to Aubertin, is an unreliable guide.

DISTRIBUTION: Recorded by Senior-White, Aubertin, and Smart from the Philippine Islands, Java, Lombok, and Singapore; spread widely through the Mariana, Caroline, and Marshall Islands, reaching Yap at least as early as 1936 and Ponape at least by 1939.

S. MARIANA IS. GUAM: Male, female, Umatac, on carabao, March 1958, Snyder and Krauss; male, Metizo, Oct. 1957, Krauss. SAIPAN: 23, July 1944, J. Greenberg, Oct. 1945, Jan. 1949, R. M. Bohart, and Aug. 1951, Maehler; Halahai-As Teo, Feb. 1945, Dybas. TINIAN: One female, Nov. 1952, Beardsley.

PALAU. NGAIANGL (Kayangel): Three females, Dec. 1952, Beardsley, and May, 1957, Sabrosky; Ngariungs, Dec. 1952, Beardsley. BABELTHUAP: 100, July 1946, Townes, and May 1957, Sabrosky; Agol, Aug. 1951, Gressitt; Ulimang, "some in grove (mango, etc.) and some on trail along stream," Dec. 1947, Dybas. KOROR: 62, throughout the year, some at light, various collectors. NGERKABESANG (Arakabesan): Six, July 1946, Townes, and May 1957, Sabrosky. MALAKAL: One female, May 1957, Sabrosky. PELELIU: One male, July 1946, Townes. ANGAUR: Three, April 1957, Sabrosky.

YAP. YAP: 102, Kolonia, Ruul Dist., Gagil Dist., West and North Rumung, South Map I., July-Aug. 1950, Goss; Yap I., Aug., Oct. 1952, Krauss;

The following table of measurements (in micrometer units, 30 = 1 mm) will help to compare the types of *L. snyderi* with a topotypical male and a female of *L. graphita* from Midway Island:

Male	L. snyderi	L. graphita
a. Head height	90	80
b. Head width	99	88
c. Parafacial width at antennal base	5	7
d. Parafacial width, minimum	5	5.5
e. Distance between vibrissae	22	17
f. Ratio of e to d	4.4	3.1
g. Length of third antennal segment	27	22
h. Length of arista	35	35
i. Width of third antennal segment	7.5	7
j. Ratio of i to c	1.5	1.0

Female	L. snyderi	L. graphita
a. Width of front	24	28
b. Antennal base to top of head	32	39
c. Parafacial width at antennal base	6	10.5
d. Parafacial width, minimum	5.5	10
e. Distance between vibrissae	18	19
f. Ratio of e to d	3.3	1.8
g. Width of third antennal segment	8	9
h. Ratio of g to d	1.5	0.9

Genus **Phaenicia** Robineau-Desvoidy

Phaenicia Robineau-Desvoidy, 1863, Hist. Nat. Dipt. **2**: 750.

Many authors prefer to use the generic name *Lucilia* in a broad sense to include *Phaenicia* and some other genera not as yet recognized in the Micronesian fauna. The distinction between *Phaenicia* and *Lucilia, sensu stricto,* is not a very substantial one, so far as known characters are concerned, but the generic classification of the Calliphoridae is at present in a status that can be considered only tentative. It is my feeling, at present not supported by sufficient evidence, that ultimately *Phaenicia* will be recognized as valid but in a redefined sense. If such proves to be the case, both *P. sericata,* the type of the genus, and *P. cuprina,* because of its close relationship to *sericata,* will fall into the redefined genus. In both of these species the frons is broad in both sexes, being about one-tenth or more the head width in the male and two-fifths or more in the female; there are three postsutural acrostichals; the subcostal sclerite lacks stiff setulae below; and the basicostal sclerite and the base of the costa are distinctly yellowish. Both species of *Phaenicia* found in Micronesia are highly domestic. They are attracted freely to both human food and human excrement; in their larval habits, they are carrion feeders with a tendency,

stronger in some strains than others, to invade living tissues. A publication by Waterhouse and Paramonov [1950, Australian Jour. Sci. Res. B **3** (3) : 310-336] should prove very useful in separating specimens of *P. cuprina* and *P. sericata.*

4. **Phaenicia cuprina** (Wiedemann). (Figure 9.)
   Musca cuprina Wiedemann, 1930, Aussereur. Zweifl. Ins. **2** : 654.
   Lucilia dorsalis Robineau-Desvoidy, 1830, Essai sur les Myodaires **2** : 453.
   Lucilia amica Robineau-Desvoidy, 1830, Essai sur les Myodaires **2** : 453.
   Lucilia elegans Robineau-Desvoidy, 1830, Essai sur les Myodaires **2** : 458.

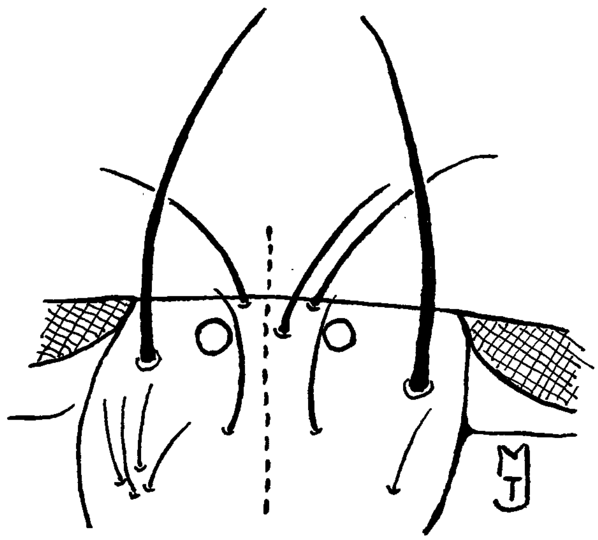


FIGURE 9.—Upper median occiput, males: left, *Phaenicia sericata;* right, *P. cuprina.* [Redrawn from James, 1955, Calif. Ins. Surv., Bull. **4** (1) : 33.]

Lucilia argyrocephala Macquart, 1846, Dipt. Exot., Suppl., 198.
Musca fucina Walker, 1849, List Dipt. Ins. Brit. Mus. **4** : 883.
Musca serenissima Walker, 1852, Ins. Saundersiana **4** : 340.
Musca temperata Walker, 1852, Ins. Saundersiana **4** : 340.
Lucilia leucodes Frauenfeld, 1867, Zool.-bot. Ges. Wien, Verh. **17** : 453.
Somomyia pallifrons Bigot, 1877, Soc. Ent. France, Ann. V, **7** : 258.
Strongyloneura nigricornis Senior-White, 1924, Spolia Zeylanica **13** : 115.
Lucilia pallescens Shannon, 1924, Ins. Inscit. Mens. **12** : 78.
Lucilia cuprina (Wiedemann), Waterhouse and Paramonov, 1950, Australian Jour. Sci. Res. B **3** (3) : 310, synonymy.

Copper-colored species. Frons broad in both sexes; frontale of male narrowest at a level about midway from antenna to ocellar triangle, at that plane being about equal to width of a parafacial. Front femur usually metallic green, in contrast to metallic blue black of *P. sericata*. Other distinguishing characters given in key.

DISTRIBUTION: Probably of African origin; widely distributed throughout both hemispheres in the tropics, subtropics, and warmer temperate regions.

BONIN IS. HAHA JIMA: One male, July 1951, R. M. Bohart.

S. MARIANA IS. GUAM: 16, Amantes I., Jan. 1946; Tumon Bay, on human feces, Jan. 1946, Gressitt; Pt. Oca, June, Dec. 1945, Jan. 1946, Bohart and Gressitt; Agana, trepang bait, July 1945, Bohart and Gressitt.

PALAU. KOROR: One male, on screen, May 1957, Sabrosky. PELELIU: Three males, Aug. 1945, Dybas.

TRUK. WENA (Moen): Nine, Civ. Ad. Area, Feb. to Apr. 1949, Potts; east of Civ. Ad. Area, Feb. 1953, Gressitt.

MARSHALL IS. ENIWETOK: Six, Eniwetok I., Jan. 1951, at light, Oshiro, and May 1946, on wet sand around building, Townes; Engebi I., May 1946, swept flowers, Oakley. KWAJALEIN: 17, March 1953, Clagg; Kwajalein I., Enelapkan and Berlin, Aug. 1944, Hall.

GILBERT IS. TARAWA: One female, July 1944, Hall.

Bionomics: This is the notorious sheep maggot of Australia. It has been incriminated in human myiasis and, since it visits both human food and human excrement, it is a potential vector of enteric pathogens. Bohart and Gressitt (1951) report it as common around both kitchens and garbage dumps in Guam. It has probably been in Micronesia longer than our records indicate.

5. Phaenicia sericata (Meigen). (Figure 9.)

Musca sericata Meigen, 1826, Syst. Beschreib. **5**: 53.
Musca nobilis Meigen, 1826, Syst. Beschreib. **5**: 56.
Musca tegularia Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 655.
Chrysomya capensis Robineau-Desvoidy, 1830, Essai sur les Myodaires **2**: 451.
Lucilia modesta Robineau-Desvoidy, 1830, Essai sur les Myodaires **2**: 454.
Lucilia pubescens Robineau-Desvoidy, 1830, Essai sur les Myodaires **2**: 454.
Lucilia callida Robineau-Desvoidy, 1830, Essai sur les Myodaires **2**: 464.
Musca pruinosa Meigen, 1830, Syst. Beschreib. **7**: 294.
Lucilia chloris Haliday, 1833, Ent. Mag. **1**: 165.
Lucilia flavipennis Macquart, 1843, Dipt. Exot. 2 (3): 139.
Lucilia basalis Macquart, 1843, Dipt. Exot. 2 (3): 148.
Musca lagyra Walker, 1849, List Dipt. Brit. Mus. **4**: 885.
Lucilia latifrons Schiner, 1862, Fauna Austriaca **1**: 590.
Lucilia sayi Jaennicke, 1867, Senckenb. Nat. Ges. Abh. **6**: 375.

Lucilia frontalis Brauer and von Bergenstramm, 1891, Zweifl. Kaiserl. Mus., Wien. **5**: 116, *nomen nudum.*

Lucilia giraulti Townsend, 1908, Smithsonian Misc. Coll. **51** (1803) : 121.

Lucilia barberi Townsend, 1908, Smithsonian Misc. Coll. **51** (1803) : 121.

Lucilia sericata (Meigen), Waterhouse and Paramonov, 1950, Australian Jour. Sci. Res. **3** (3) : 310-336, synonymy; Zumpt, 1956, Explor. Parc Nat. Albert Belg. Congo **87** : 72, synonymy.

A greenish species which may tend to be coppery, sometimes indistinguishable in general color from *P. cuprina.* Vertex of male not as broad as that of *P. cuprina* but frontale gradually widening toward antennae, its width about midway distinctly greater than that of a parafacial. Front femur usually dark metallic blue or bluish black.

DISTRIBUTION: Worldwide, in temperate regions; Bonin Is., New Hebrides, Hawaiian Is., Volcano Is., Marshall Is., Wake I.

BONIN IS. HAHA JIMA: Female, July 1951, R. M. Bohart.

VOLCANO IS. IWO JIMA: Female, Sept. 1945, Dybas.

WAKE I. Peale I.: 14, July 1940, some in greenhouse, Lyons; Feb. 1953, Joyce.

MARSHALL IS. KWAJALEIN: Two, March 1953, Clagg.

P. sericata, the common green-bottle fly of Europe and North America, an important contaminator of foods, is commonly involved in sheep strike in certain parts of the world, and in several types of human and animal myiasis.

Records from the tropics seem to be based on localized colonies, but it now ranges widely in temperate regions throughout the world, apparently distributed in recent years by man. Our few records indicate that it apparently has not invaded Micronesia very successfully.

SUBFAMILY CHRYSOMYINAE

Genus **Chrysomya** Robineau-Desvoidy

Chrysomya Robineau-Desvoidy, 1830, Essai sur les Myodaires **2** : 444.

I am considering the Micronesian material as representing but a single genus, *Chrysomya. C. nigripes* Aubertin is referable to Townsend's *Microcalliphora,* if that genus is to be recognized, but the calliphorid genera need to be subjected to considerable study before a decision can be reached on the matter.

6. Chrysomya megacephala (Fabricius). (Figure 10, *b, d.*)

Musca megacephala Fabricius, 1784, Syst. Ent. **4**: 317.

Musca dux Eschscholtz, 1822, Entomographien **1** : 114.

Chrysomya duvaucelli Robineau-Desvoidy, 1830, Essai sur les Myodaires **2** : 451.

Chrysomya gratiosa Robineau-Desvoidy, 1830, Essai sur les Myodaires **2** : 451.

Lucilia flaviceps Macquart, 1843, Dipt. Exot. **2** (3) : 145.
Musca remuria Walker, 1849, List Dipt. Brit. Mus. **4**: 871.
Musca bata Walker, 1849, List Dipt. Brit. Mus. **4**: 875.
Musca combrea Walker, 1849, List Dipt. Brit. Mus. **4**: 876.
Somomyia saffranea Bigot, 1877, Soc. Ent. France, Ann. V, **7**: 257.
Somomyia pfefferi Bigot, 1877, Soc. Ent. France, Ann. V, **7**: 257.
Somomyia dives Bigot, 1887, Soc. Zool. France, Bull. **1887**: 599.
Somomyia cyaneo-cincta Bigot, 1887, Soc. Zool. France, Bull. **1887** : 604.
Chrysomya megacephala (Fabricius), Senior-White, Aubertin, and Smart, 1940, Fauna Brit. India, Dipt. **6**: 138, synonymy.

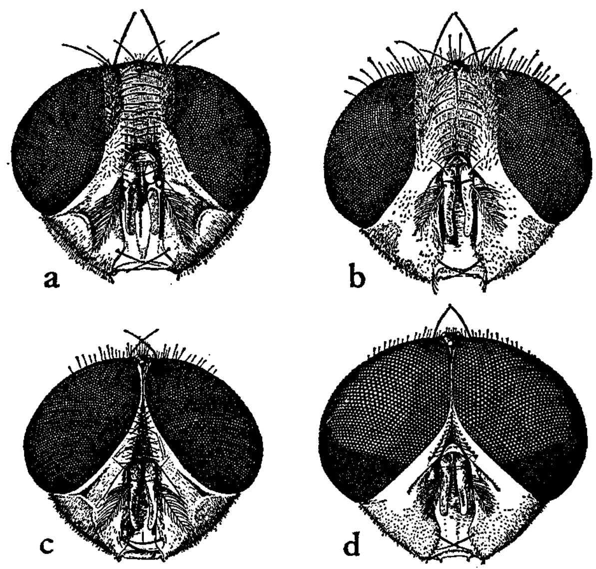


FIGURE 10.—Heads of *Chrysomya,* front view: **a**, *C. bezziana,* female; **b**, *C. megacephala,* female; **c**, *C. bezziana,* male; **d**, *C. megacephala,* male. (After James, 1948, U.S. Dept. Agric., Misc. Pub. **631**: 68.)

Robust, with a broad head; face and cheeks strikingly orange to orange yellow; thorax and abdomen greenish blue, with purple reflections; abdominal tergite 1 and posterior margins of the apparent tergites 2 and 3 black.

DISTRIBUTION: Widespread throughout the warmer eastern Palaearctic, the Oriental, and Australian regions; through the south Pacific and throughout Micronesia to Hawaii.

BONIN IS. MUKO JIMA: July 1951, R. M. Bohart. CHICHI JIMA: July 1951, R. M. Bohart; Kiyose, Oct. 1934, Okabe; Futami-ko, May 1956, Clagg. HAHA JIMA: Okimura, April to May 1958, Snyder.

VOLCANO IS. IWO JIMA: Sept. 1945, Dybas, June 1958, Snyder.

N. MARIANA IS. PAGAN: July 1951, R. M. Bohart, and Aug. 1954, Corwin; Laguna, Songsong-Regusa, and Regusa-Tarage, April 1940, Yasumatsu and Yoshimura. ALAMAGAN: July 1951, R. M. Bohart. ANATAHAN: July 1951, R. M. Bohart.

S. MARIANA IS. SAIPAN: July 1940, Matusita; Aug. 1951, R. M. Bohart; 1 to 2 mi. east of Tanapag, Nov. 1944, S. Edgar; Garapan, June 1939, Esaki, and May, 1945, Dybas; Fanaganan, May 1940, Yasumatsu and Yoshimura; Oleai-Hinashisu-Charanka, Nov. 1937, Esaki. TINIAN: Mar. 1946, some in cornfield, Hadden. AGIGUAN: June 1952, Kondo; May 1952, Peterson. ROTA: July 1925, ex decaying meat, Hornbostel; Susan Isthmus, Oct. 1945, W. L. Necker. GUAM: Aug. 1923, ex carrion, Hornbostel; July 1945, dead pig, Bohart and Gressitt; Pt. Ritidian, June 1945, from corpse, Bohart and Gressitt; Pt. Oca, May 1945, some on dead mollusk, and June 1945, feeding on sugar and rat, Bohart and Gressitt; Tumon, Nov. 1952, Gressitt; Agana, May 1945, Bohart and Gressitt; Mt. Alifan, April 1946, Krauss; Mt. Lamlam, 400 m., Nov. 1952, Gressitt; Umatac, May 1945, Bohart and Gressitt; southeast coast, May 1945, dead dog (fresh), Bohart and Gressitt; Ukudu, Jan. 1945, larva in dead toad, Gressitt.

PALAU. NGAIANGL (Kayangel): May 1957, Sabrosky. BABELTHUAP: Ulimang, Dec. 1947, Dybas; June 1957, Sabrosky. KOROR: Dec. 1952, light trap, Gressitt; Dec. 1947, Dybas; July and Sept. 1952, Beardsley; July 1956, McDaniel; Apr. 1957, Sabrosky. NGERKABESANG: May 1957, Sabrosky. PELELIU: Aug. 1945, Hagen; North end, at light, May 1957, Sabrosky. ANGAUR: Ono.

YAP. YAP: Aug. and Oct. 1952, Krauss.

CAROLINE ATOLLS. ULITHI: Asor I., Oct. 1952, Krauss. WOLEAI: Woleai I., Feb. 1953. IFALUK: Ifaluk, Sept. 1953, Bates. KAPINGAMARANGI: Touhou, July 1954, ex fish and other marine specimens, over collected corals and shells; Taringa, July 1954, around light; Matiro, July 1954, ex turtle shell, Niering.

TRUK. WENA (Moen): Civ. Ad. Area, Feb. to April, 1949, Potts.

PONAPE. Colonia, July 1949, over dead frog, Owen; Feb. 1948, Dybas; Nahpoli (Napali), June to Sept. 1950, Adams.

KUSAIE. Pukusrik, Apr. 1954, Clarke; Mutunlik, Feb. 1953, Clarke; Mwot, Apr. 1953, Clarke.

WAKE: June 1947, J. P. Martin; Nov. 1953, Joyce; Nov. 1947.

MARSHALL IS. ENIWETOK: Engebi, Dec. 1950, sweeping *Portulaca;* Bogombogo, Dec. 1950, *Messerschmidia,* Oshiro. KWAJALEIN: Mar. 1953, and Sept. 1956, Clagg; Dec. 1952, Clarke; May 1944, Enke; Lojjaiong (Loi), Sept. 1944, Wallace; Ebeye, Oct. and Dec. 1953; Kwajalein, May 1952, Krauss. LIB: Oct. 1953. NAMU: Majkon, Oct. 1953; Namo, Oct. 1953. AILINGLAPALAP: Ailinglapalap, May and Oct. 1953. JALUIT: Jabwar, Nov.

1937, Esaki. MAJURO: Lliga, Dec. 1953. ARNO: Kilange (Kirage), Oct. 1953, Beardsley. MILI: Nallo (Alu), Oct. 1953, Beardsley.

GILBERT IS. TARAWA: Mar. 1951, R. Catala; Banraeaba, Betio, and Bonriki I., Aug. 1956, E. S. Brown. ABEMAMA (Apamama): May 1944, Enke. ONOTOA: Tanyah (Buiartun), July 1951, on flowers of *Messerschmidia,* Moul.

C. megacephala is essentially a saprophagous species, breeding in decomposing animal matter, though it occasionally will infest foodstuffs or invade diseased tissues of living animals, including man. From various reports it seems to be the most common muscoid fly in much of its range, including Guam (Bohart and Gressitt, 1951). As a menace to human health this fly assumes a role in its area similar to that of *Musca domestica* in North America and Europe. It may have entered the Bonin and Volcano Islands, and possibly the Marianas, by way of Japan. My records from Micronesia extend back to Hornbostel's collections on Guam in 1923, and on Rota in 1925; other pre-war records are those of Okabe on Chichi Jima, 1934, and of Esaki on Saipan and Jaluit, both in 1937.

The specific myiasis-producing *C. bezziana* (Villeneuve), which so far has not been recorded from Micronesia, may be distinguished from this species by the narrower, parallel-sided (in contrast to the slightly convex) front of the female, the waxy white squamae, and the uniform-sized facets of the male eye (fig. 10, *a, c*).

7. Chrysomya rufifacies (Macquart).

Lucilia rufifacies Macquart, 1843, Dipt. Exot. **2** (3): 146 (attributed to Guerin).

Lucilia orientalis Macquart, 1843, Dipt. Exot. **2** (3): 145.

Lucilia pavonina Schiner, 1868, Reise Novara, Diptera, 305.

Somomyia melanifera Bigot, 1877, Soc. Ent. France, Ann. V, **7**: 258.

Somomyia barbata Bigot, 1877, Soc. Ent. France, Ann. V, **7**: 39.

Somomyia micropogon Bigot, 1887, Soc. Zool. France, Bull. **12**: 601.

Chrysomyia cordieri Séguy, 1925, Soc. Ent. France, Bull. **1925**: 303.

Chrysomyia putoria Auctt. *nec.* Wiedemann.

Chrysomyia albiceps Auctt. *nec.* Wiedemann.

Chrysomyia rufifacies (Macquart), Senior-White, Aubertin, and Smart, 1940, Fauna Brit. India. Dipt. **6**: 141, synonymy.

Readily recognizable from its key characters; it may be distinguished from the very similar *C. albiceps* (Wiedemann) of the western Oriental, Palearctic, and Ethiopian regions in that *albiceps* lacks stigmatic bristles.

DISTRIBUTION: Common throughout the Oriental and Australian regions, to Micronesia.

N. MARIANA IS. AGRIHAN: Ten, Aug. 1945, Borror and Holder; July 1951, R. M. Bohart. PAGAN: One female, July 1951, R. M. Bohart.

S. MARIANA IS. SAIPAN: One male, Chalan Kanoa, Aug. 1944, Hall; one male, Aug. 1951, R. M. Bohart; one female, Mt. Susupe, Apr. 1946, Krauss. AGIGUAN: Eight, May 1952, Peterson, Owen; at light, July 1954, Davis. GUAM: 61, many localities, Apr. to Aug. and Nov. to Jan., some on carrion, fish bait, dead mollusks, a dead dog, and at light, Bohart and Gressitt.

PALAU. BABELTHUAP: Four, cacao, Apr. 1957, Sabrosky; East Ngatpang, 65 m., Dec. 1952, at light, Gressitt; Imeliik-Netkeng, June 1957, Sabrosky. KOROR: Five, Sept. 1952, Krauss; Apr. 1957, Sabrosky. NGERKABESANG: Female, Apr. 1957, Sabrosky.

YAP. YAP I.: Colonia, July to Aug. 1950, Goss.

TRUK. WENA (Moen): Four, Oct. 1952, March, Apr. 1949, Beardsley; June, 1949.

PONAPE. Six, Agric. Expt. Sta., June to Sept. 1950, Adams; Rohnkiti (Ron Kiti), May 1948, fly trap, snail baited, H. S. Hurlbut.

KUSAIE. Two females, Funaunpes, Jan. 1953, Clarke; Pukusrik, Apr. 1953, Clarke.

MARSHALL IS. MAJURO: Uliga, Oct., Nov. 1953, Beardsley.

Bionomics: This is essentially a saprohagous species. In Australia it is a secondary sheep maggot, but its primary and principal breeding medium is carrion and other decaying animal material, where it feeds both on the decaying flesh and on other maggots that are living in it. Because of its lack of domestic habits and its absence from human excrement this fly is of little medical importance.

In Micronesia, *C. rufifacies* is apparently becoming widely established, though in much smaller numbers than *C. megacephala*. Its absence from the Caroline Atolls may be due to lack of records, to its failure so far to be introduced into those islands, or to the possible failure of the fly to establish itself, possibly because of competition with *C. megacephala,* under the restricted conditions of the atolls.

8. Chrysomya nigripes Aubertin.

Chrysomyia (*Microcalliphora*) *nigripes* Aubertin, 1932, Ann. Mag. Nat. Hist. X, **9**: 26.

Chrysomya (*Microcalliphora*) near *nigripes* Aubertin, Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 128.

DISTRIBUTION: Ceylon, India, Indo-China, Philippines, Solomon Is., New Hebrides, Mariana Is. (Guam).

S. MARIANA IS. GUAM: 22, Pt. Ritidian, on corpse, June 1945, Gressitt; Pt. Oca, May, June 1945, Bohart and Gressitt; Umatac, May 1945, Bohart and Gressitt.

After examining a paratype female of this species, together with specimens from Assam, Cambodia, and the Philippines which were sent to me through

the courtesy of Mr. C. W. Sabrosky, I am convinced that the Micronesian material is the true *C. nigripes*. It is the only known Oriental-Micronesian representative of the subgenus (or genus?) *Microcalliphora,* and it may readily be distinguished from the other known species, all from the Australian region, by the black legs. The small size (usually 8 mm. or less) and the very broad front of the male will distinguish this species from more typical *Chrysomya.*

Bionomics: According to Bohart and Gressitt (1951), this is a common larval invader of putrid carrion in Guam, and probably of no medical importance. Elsewhere, its bionomics seem to be unknown.

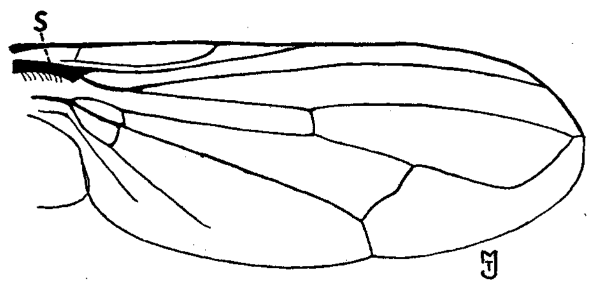


FIGURE 11.—*Rhinia apicalis,* wing venation, infuscation omitted (S, stem vein).

Genus **Rhinia** Robineau-Desvoidy

Rhinia Robineau-Desvoidy, 1830, Essai sur les Myodaires, 422.

9. Rhinia apicalis (Wiedemann). (Figure 11.)
Idia apicalis Wiedemann, 1830, Aussereur. Zweifl. Ins. **2** (3) : 354.
Rhinia testacea Robineau-Desvoidy, 1830, Essai sur les Myodaires, 423.
Idia flavipennis Macquart, 1843, Dipt. Exot. **2** (3) : 125.
Idia punctata Bigot, 1858, Archiv. Ent. **2** : 24.
Idia pleuralis Thomson, 1868, Eugenies Resa, Dipt., 542.
Beccarimyia glossina Rondani, 1873, Mus. Civ. Stor. Nat. Genova, Ann. **4** : 287.
Rhinia fulvipes Bigot, 1874, Soc. Ent. France, Ann. V, **4** : 239.
Idiella trineuriformis Speisser, 1910, Kilimandjaro Meru Exped. **10** : 153.
Rhinia apicalis (Wiedemann) Malloch, 1926, Ann. Mag. Nat. Hist. IX, **18** : 503-504.—Séguy, 1928, Encycl. Ent. **9** : 191.—Peris, 1952, Estac. Exp. Aula Dei, Anal. **3** : 43, synonymy.

DISTRIBUTION. Widespread, throughout Africa, Asia Minor, southeastern Asia, Solomon Is., Fiji, Philippine Is., Micronesia, and Hawaii.

S. MARIANA IS. SAIPAN: 11, Aug. 1951, R. M. Bohart; Achugau area, Jan. 1945, on sand at dusk, Dybas; Chalan-Kanoa, Feb. 1940, Yasumatsu and Yoshimura, Oct. 1944, and Aug. 1944, on dead snails. GUAM: 13, Pt. Ritidian, on corpse, June 1945; Pt. Oca, May, June 1945; Agana, May, Aug. 1945, all Bohart and Gressitt; Togcha Bay, July 1946, Fosberg.

PALAU IS. NGAIANGL (Kayangel): Three females, Dec. 1952, Beardsley. BABELTHUAP: One male, Ulimang, Dec. 1947, Dybas. KOROR: Three, July, Sept. 1953, at light, Beardsley; Mar. to May 1954, Osborne. PELELIU: Two females, July, Sept., ex *Oryctes*, coconut stump, Gressitt.

CAROLINE ATOLLS. ULITHI: One male, Falalop, Apr. 1952, Beardsley. WOLEAI: Two males, Woleai, Feb. 1953, Beardsley. IFALUK: One female?, Ifaluk, Sept. 1953, Bates. FARAULEP: Two, Fuasubukoru, Feb. 1953, Beardsley. LAMOTREK: One male, Lamotrek, Feb. 1953, Beardsley. NOMWIN: Six, Nomwin, Feb. 1954, Beardsley. KAPINGAMARANGI: Nine, Werua area, Aug. 1954, Niering; Touhou, "through coconut-breadfruit types and across puraka," June 1954, Niering; Tangawaka, Aug. 1954, Niering. PINGELAP: One female, July 1949, Owen.

TRUK. WENA (Moen): 30, Feb.-Apr. 1949, Potts, and Jan. 1945; South Valley, Mt. Tonaachau, Apr. 1949, Potts. TOL (Ton): Olej, Apr. 1940, Yasumatsu and Yoshimura.

MARSHALL IS. KWAJALEIN: Two males, Ebeye, Oct. 1953, Beardsley. JALUIT: One female, Majurirek I., Apr. 1958, Gressitt. NAMORIK: Five, Namorik, Sept., Oct. 1953, Beardsley. LIKIEP: Four, Likiep, Aug. 1946. MAJURO: One female, Uliga I., Aug.-Sept. 1955, M. R. Wheeler.

GILBERT IS. TARAWA: 78, March 1951, Catala, and July 1945, Hall; Betio I., Aug. 1956, E. S. Brown; Banraeaba I., Aug. 1956, Brown, and Dec. 1956, Krauss; Bairiki I., Nov., Dec. 1957, and Taborio, Dec. 1957, Krauss. APAMAMA: Oct. 1954, Hall.

Though Malloch thought he recognized three species here on the basis of male genitalia, I must agree with Peris and Zumpt that these differences are trivial and inconstant. The clouding at the apex of the wing, on the basis of which Séguy recognized a varietal distinction, is also inconstant, as Peris pointed out.

Bionomics: Bohart and Gressitt (1951) reported this species (as *testacea*) from dead fish and from a human corpse on Guam; the flies, which occurred principally near ocean beaches and coastal villages, were observed to oviposit on sand where picnic leftovers and dead small marine animals were abundant. Peris cites Cuthbertson [1938, Rhodesia Sci. Assoc., Trans. **36** (1): 115-130] as recording oviposition in detritus in burrows, in ant nests, and in soil rich in humus, and as listing the larvae as parasitic on the ant *Dorylus* sp. and the wasp *Bembex melanopa* Hand.

Genus **Stomorhina** Rondani

Stomorhina Rondani, 1861, Dipt. Ital., Prodr. **4**: 9.

Though Peris and Zumpt accept both *Rhinia* and *Stomorhina,* their interpretations of the genera are different. Peris, who refers *discolor* and *obsoleta* to *Rhinia,* bases the division chiefly on the posterior mesosternal bristles which form a complete row in *Stomorhina* but which with rare exceptions are reduced to the uppermost in *Rhinia.* Zumpt characterized *Rhinia* by the long-petiolate cell R_5, the lack of small polished spots on the mesopleura, and the wholly or predominantly yellow-brown abdomen; in *Stomorhina,* cell R_5 is usually open, but if closed, the mesopleura have numerous small polished spots and the abdomen is black with yellow markings. Zumpt points out that *Rhinia,* as he interprets the genus, has male genitalia strikingly different from those of *Stomorhina.* The problem of generic limits in this group cannot be solved without a thorough study. Since for the present purposes a temporary decision has to be made, I am following Senior-White, Aubertin, and Smart; Bohart and Gressitt; and Zumpt, who have dealt with the neighboring faunas, rather than adopting what would ordinarily appear the better course, that of following the most recent monographer of the group.

10. Stomorhina discolor (Fabricius).

Musca discolor Fabricius, 1805, Systema Antliatarum, 295.

Idia metallica Macquart, 1835, Hist. Nat. Ins. Dipt. **2**: 246.

Idia quadrimaculata Macquart, 1851, Diptères exotiques, suppl. **4** (2): 213.

Idia aequalis Walker, 1859, Linn. Soc. London, Proc. **3**: 103.

Idia cincta Bigot, 1874, Ent. Soc. France, Ann. V, **4**: 238.

Stomorhyna muscina Rondani, 1875, Mus. Civ. Stor. Nat. Genova, Ann. **7**: 429.

Stomorhina scalaris Bigot, 1887, Soc. Ent. France, Bull. **12**: 591.

Stomorhina discolor (Fabricius), Senior-White, Aubertin, and Smart, 1940, Fauna Brit. India, Dipt. **6**: 192.

Rhinia discolor (Fabricius), Peris, 1952, Estac. Exp. Aula Dei, Anal. **3**: 32, synonymy.—Zumpt, 1956, IN Lindner, Flieg. Palaearkt. Reg. **64** (i): 120.

Spot at wing apex usually clear and distinctive. Abdominal pattern varies; usually dorsal aspect of tergum 1 is largely yellow, except for its posterior border, and that of tergum 2 has two prominent spots, interrupted medially; tergum 3 may bear a similar pair of spots, but the amount of black may vary considerably over-all, so that abdomen dorsally may be black except for middle of tergum 1 and a pair of obscure spots on 2, or it may be mostly yellow except at apex. Femora sometimes wholly black, but in most of the Micronesian material hind pair is distinctly yellow at base.

DISTRIBUTION: Widespread; Australian and Oriental regions.

S. MARIANA IS. SAIPAN: 19, Aug. 1944, Isely, and Aug. 1951, R. M.

Bohart; Mt. Tagpochau, 375 m., Feb. 1945, Dybas; Chalan Kanoa, Aug. 1944; Afetna Pt., June 1946, Townes. TINIAN: Male, Nov. 1952, Beardsley. ROTA: Male, June 1951, R. M. Bohart. AGIGUAN: Female, May 1952, Owen. GUAM: 11, Pt. Ritidian, June 1945, on corpse, Bohart and Gressitt; Pt. Oca, May, June 1945, Nov. 1952, Bohart and Gressitt; Agana, May 1945, at light, and Aug. 1945, on sea cucumber, Bohart and Gressitt; Mt. Alifan, Apr. 1946, Krauss.

PALAU. BABELTHUAP: 14, Ulimang, Dec. 1947; Imeliik-Netting, June 1957, Sabrosky; Ngardok, May 1957, Sabrosky; Ngerchelong, May 1957, Sabrosky; Ngiwal, May 1957, Sabrosky; Ngaremlengui, June 1957, Sabrosky. KOROR: 18, Sept., Oct. 1952, Apr., June 1953, Beardsley; Apr. 1957, Sabrosky. NGARMALK: Three females, May 1957, Sabrosky. ANGAUR: Male, Dec. 1949, Owen.

YAP. YAP I.: Female, Kolonia, July to Aug. 1950, Goss.

TRUK. WENA (Moen): Nine, Feb. to Apr. 1949, Potts.

GILBERT IS. TARAWA: Female, Banraeaba, Feb. 1957, Krauss.

The variation in color pattern in this species is undoubtedly responsible for the fact that it has been described several times as a new species.

Bionomics: This species has been recorded by several authors (Senior-White, Aubertin, and Smart, 1940) as a predator in the nests of ants, bees, and termites. According to Peris, it may accidentally enter houses.

11. Stomorhina obsoleta (Wiedemann).

Idia obsoleta Wiedemann, 1830, Aussereur. Zweifl. Ins. **2** (3): 355.

Rhinia obsoleta (Wiedemann), Peris, 1952, Estac. Exp. Aula Dei, Anal. **3**: 46.

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DISTRIBUTION: China, Japan, Bonin Is.

BONIN IS. CHICHI JIMA: 158, July 1951, R. M. Bohart; Ogiura, June 1949, Mead; Ototo Jima, Ani Jima, Miyanohama, Omura, Okumura, Ogiura, Sakai-Ura, Yoake Yama, and Tatsumi Wan, Apr. to June 1958, Snyder.

This species, which has obviously entered Micronesia from the north, probably Japan, seems to be well established on Chichi Jima, but as yet not elsewhere in Micronesia.